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MAMMALS OF NORTHERN COLOMBIA

PRELIMINARY REPORT NO. 4: MONKEYS (PRIMATES), WITH TAXONOMIC REVISIONS OF SOME FORMS

By Philip Hershkovitz

Monkeys collected in northern Colombia by the author during his tenure of the Walter Rathbone Bacon Traveling Scholarship number 202 specimens. The genera of simians known to occur in the region are *Cebus*, *Ateles*, *Alouatta*, *Aotus*, and *Marikina*. Each of these genera is represented in the collection by one species.

The greater part of this report is devoted to a taxonomic review of the whole of that group of the genus *Cebus* which includes the species collected. The other cebid genera, *Ateles*, *Alouatta*, and *Aotus*, are treated with more circumscription, as the taxonomic problems affecting them are less embroiled. The bare-faced tamarins, genus *Marikina*, which include the three species of northern Colombian marmosets, are revised. The remaining tamarins of the same genus, and the little lion-monkeys, genus *Leontocebus*, are also discussed and arranged by species.

Nearly all pertinent type specimens preserved in this country, in London, and in Paris have been examined. For permission to study this material, as well as for the loan of specimens from various American institutions, the author expresses his thanks to the authorities of the Muséum National d'Histoire Naturelle, Paris, the British Museum (Natural History), the American Museum of Natural History, the Chicago Natural History Museum, the Museum of Comparative Zoology, Harvard University, and the Carnegie Museum.

COLOR TERMS AND ABBREVIATIONS

Capitalized color terms are from Ridgway (Color Standards and Color Nomenclature, pp. vi+44, 53 plates, 1912). The following

abbreviations represent the institutions whose collections of monkeys were examined:

A.M.N.H. = American Museum of Natural History, New York.
B.M. = British Museum (Natural History), London.
C.M. = Carnegie Museum, Pittsburgh.
C.N.H.M. = Chicago Natural History Museum.
M.C.Z. = Museum of Comparative Zoology, Cambridge.
M.N.H.N. = Muséum National d'Histoire Naturelle, Paris.
U.S.N.M. = United States National Museum, Washington.

GENUS CEBUS ERXLEBEN: MICOS AND MACHINES

The 66 micos collected in northern Colombia are referable to *Cebus albifrons*. No other species of the genus occurs in the area. Other species of *Cebus* found elsewhere in Colombia are *C. capucinus*, *C. nigrivittatus*, and *C. apella*. The last species mentioned represents a section of the genus hereinafter referred to as "tufted." The others compose the "untufted" section.

Before listing the forms collected, it is necessary to characterize each of the representative species of the genus *Cebus* and to establish the bases for the nomenclature adopted here. The more recent publications on the subject, being those currently accepted as guides to characters and nomenclature of the species of *Cebus*, are critically reviewed. The status of each of the names correctly or incorrectly applied to an "untufted" *Cebus* is examined. The status of each of the named forms of "tufted" *Cebus* will be dealt with in a report being prepared by Dr. Remington Kellogg.

CHARACTERS AND COMPARISONS OF "UNTUFTED" AND "TUFTED" SPECIES

Attempts to separate "tufted" from "untufted" cebids on the basis of cranial characters have never been wholly satisfactory. Tate (1939, p. 210) offered a table of comparative differences in skulls of the two groups. He pointed out, however (p. 209), that the differences are relatively small and that characters that hold for one sex are sometimes invalid for the other. Certain of these differences have been found to have a qualified and relative value when applied to present material. The character referring to the sagittal crest appears to be valid; that of the structure of the mandible holds in most cases. Characters referring to the relation of the maxillomalar suture to the lower margin of the orbit, and to the dimensions of the external narial opening, lose significance in present examples. The character of width of pterygoid fossa as given by Tate is too relative. Restated, however, that character forms parts of a more complex difference between the two groups of *Cebus*. Cranial characters distinguishing the groups are given in the following tabulation.

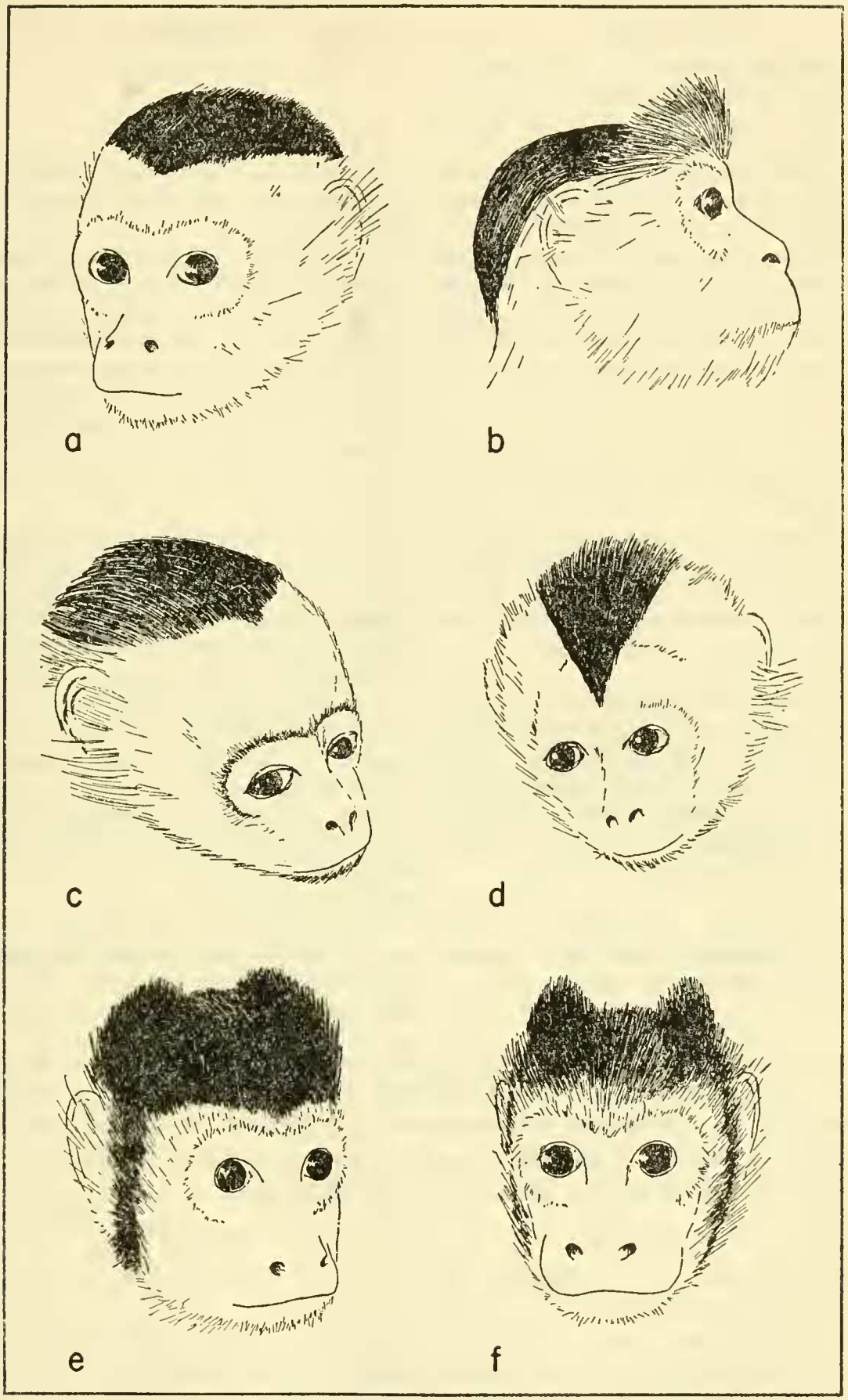

FIGURE 52.—Head patterns of *Cebus: a, C. albifrons; b, C. albifrons* (female with moderately developed superciliary brush); *c, C. capucinus; d, C. nigrivittatus; e, f, C. apella* with prominent and moderately developed tufts, respectively.

"Untufted" (*Cebus capucinus, C. albifrons, C. nigrivittatus*) (Pls. 15, *a;* 16, *a*)	"Tufted" (*Cebus apella*) (Pls. 15, *b;* 16, *b*)
1. Temporal ridges weakly developed, more or less parallel-sided, never converging to form a sagittal crest.	1. Temporal ridges more developed, convergent, in old males uniting to form a sagittal crest.
2. Bony rings encircling orbits joined at roots of nasals to form well-defined, nearly horizontal superciliary ridges. Frontals above orbits plane or slightly rounded in males, more rounded in females.	2. Superciliary ridges weak or obsolete; temporal ridges rising obliquely up and back from bony rings of orbits to define a triangular-shaped forehead in adult males and old females. Frontal region above orbits always forming a convex eminence with a pronounced vaulting in females.
3. Brain case relatively low, dolichocephalic.	3. Brain case more vaulted, less dolichocephalic.
4. Ramus of mandible in males comparatively low, depth from condyle usually less than length of C–M^3; in females, mandible weaker with ramus relatively lower.	4. Ramus of mandible in males comparatively high, depth from condyle usually more than length of C–M^3; in females, mandible generally as in males of "untufted" but with ramus averaging relatively higher.
5. Vomer situated more posteriorly, the vertical plate nearly always well exposed behind plane of posterior border of palate; wings of vomer heavy, little, or not at all separated from each other, the presphenoid, if present, not visible from ventral aspect.	5. Vomer situated more anteriorly, the vertical plate hardly, or not at all, exposed behind plane of posterior border of palate; wings of vomer more delicate, well spread, revealing a presphenoid (normally distinct but may be fused to basisphenoid, especially in old males).
6. Pterygoid fossa and posterior narial openings wider, the internal pterygoid plate and hamular processes tending to converge.	6. Pterygoid fossa and narial openings narrower, the internal pterygoid plates more nearly parallel-sided, the hamular processes tending to diverge.

None of the above characters are absolute. It is believed, however, that any normal adult skull selected at random can be correctly classified by a judicious determination of which set of cranial characters best applies. This, taken together with external characters given below, should be ample for positive identification.

"Untufted" (*Cebus capucinus, C. albifrons, C. nigrivittatus*)	"Tufted" (*Cebus apella*)
1. Frontal tufts normally absent in males; when present in females, placed well forward and in form of superciliary brush or frontal diadem with the long, erect hairs radiating from midfrontal	1. Frontal tufts usually present in adults of both sexes; tufts may be paired with one on each side of crown in form of "horns," ridges, or lines of short erect hairs, or as a single brushlike

region and of same general coloration as rest of forehead. (Fig. 52, *b*.)

2. Cap of crown, in males and untufted females, broad or narrow, rounded in front or pointed, greatest width from one-third to nearly total distance between ears. A midfrontal line or wedge of dark hairs to root of nose present or absent. (Fig. 52, *a*, *c*, *d*.)

3. Dark preauricular band absent; sides of face, chin, throat whitish to brown, rarely with darker streaks on cheeks. (Fig. 52, *a–d*.)

topknot or transverse ridge; never in form of thin superciliary brush or diadem; color of hairs of tufts, at least terminally, like coronal cap and contrasting with pale superciliary band, if present. (Fig. 52, *e*, *f*.)

2. Cap of crown always broad, never acutely pointed or wedge-shaped in front, greatest width nearly equal to distance between ears. A midfrontal wedge, never a line, of dark hairs to root of nose often present. (Fig. 52, *e*, *f*.)

3. A contrastingly dark preauricular band on each side of face usually present; the bands normally extending from cap to under chin where they may unite. (Fig. 52, *e*, *f*.)

Number of lumbar vertebrae has often been cited as distinctive for each group or, at least, for certain species of each group. Members of the "tufted" group are said to have five lumbar vertebrae, and six are attributed to the "untufted" species. The following number of vertebrae have been noted in each of the available skeletons in the United States National Museum collection:

"Tufted" (*C. apella*, Matto Grosso, Brazil)

No. 270360	♀	7 cervical	12 thoracic	6 lumbar	3 sacral
No. 270361	♂	7 cervical	13 thoracic	5 lumbar	3 sacral

"Untufted" (*C. capucinus*, Central America)

No. 256742	♀	7 cervical	14 thoracic	6 lumbar	3 sacral
No. 25310	–	7 cervical	14 thoracic	5 lumbar	3 sacral

"Untufted" (*C. albifrons*, northern Colombia)

No. 281565	♂	7 cervical	15 thoracic	6 lumbar	2 sacral
No. 281569	♂	7 cervical	15 thoracic	5 lumbar	3 sacral
No. 281570	♀	7 cervical	14 thoracic	6 lumbar	3 sacral
No. 281606	♂	7 cervical	14 thoracic	6 lumbar	3 sacral

Apparently the difference between "tufted" and "untufted" species lies in the number of thoracic vertebrae. However, too few specimens have been examined for affirming any real difference between the groups on the score of number of precaudal vertebrae. So far it can be said that total of combined number of thoracic, lumbar, and sacral vertebrae is 22 or 23 in "untufted," and 21 in "tufted" cebids.

COMPARISONS OF CEBUS ALBIFRONS AND CEBUS NIGRIVITTATUS

Among "untufted" cebids, the black white-fronted *Cebus capucinus* of Central America, western Colombia, and western Ecuador is readily distinguished from all others. In color pattern of body, "untufted"

Cebus albifrons partially resembles pale, or erythristic, members of the "tufted" group, while *C. nigrivittatus* could be confused with dark brown or blackish "tufted" monkeys. Superficial characters separating *albifrons* from *nigrivittatus* are outlined below and may be of additional service in distinguishing them from "tufted" forms.

Cebus albifrons (Fig. 52, *a–b*)	*Cebus nigrivittatus* (Fig. 52, *d*)
1. Cap in males (and females without superciliary brush or frontal diadem), usually well rounded, extending from crown to back of head, and broadly outlined in front by whitish to buffy superciliary or transverse frontal band; height of superciliary band equal to about one-half distance between ears, and with or without a dark median line from cap to root of nose.	1. Cap in males (and untufted females) smaller, narrower, triangular or wedge-shaped with apex in front, usually restricted to crown and sharply outlined from sides of head; pale superciliary band narrower, height at midfrontal line about one fourth or less distance between ears and usually with a line or wedge of dark hairs from cap to root of nose.
2. Back and sides of body more or less uniformly yellowish to reddish or brown; median dorsal band, if present, poorly defined; hairs uniformly colored or with bases paler and never with sharply contrasting paler tips.	2. Back and sides yellowish to nearly black, median dorsal band, when present usually moderately well defined; hairs at least of sides of back usually conspicuously annulated, the wide pale terminal bands contrasting with darker subterminal portions.
3. Tail never blackish, upper side like back or with hairs punctulated, usually becoming paler terminally.	3. Tail above like back proximally, usually becoming darker terminally,
4. Hairs of outer side of forearm and foreleg uniformly yellowish to reddish or brown or gradually becoming paler from tip to base; sometimes with distinct annulations or paler tips; wrist, ankle, and upper surface of hand and foot not markedly darker.	4. Hairs of outer side of forearm and foreleg dark brown or gray basally or subterminally, sharply paler terminally; wrist, ankle, and upper surface of hand and foot usually contrastingly darker, or blackish.
5. Hairs of chest and belly usually paler than terminal portions of hairs of back.	5. Hairs of chest and belly usually darker than terminal portions of hairs of back.
6. Pelage generally smoothly adpressed and of a soft, silky texture.	6. Pelage generally lax and of a coarser texture.

In general, *C. albifrons* is delicately built and brightly colored, with forearms, legs, and tail never blackish as in the "tufted" species. In contrast, *nigrivittatus* is larger, more robust and somberly colored, and approaches the "tufted" forms in color of limbs and tail. Its skull is larger and more dolichocephalic than that of *albifrons*. A more detailed description of *Cebus albifrons* is given later under specific and subspecific headings.

REVIEW OF RECENT LITERATURE

Three species of "untufted" micos are identifiable. First, *Cebus capucinus* Linnaeus, 1758. It is distinguished from all others by the uniformly black pelage on crown, back, sides, tail, and limbs contrasted with the whitish to buffy face, forehead, throat, sides and front of neck, chest, shoulders, and inner and front sides of upper arms. This mico is referred to in this discussion as the black white-fronted *Cebus*. The second species is *Cebus albifrons* Humboldt, or the brown pale-fronted *Cebus*. Its color is distributed in much the same pattern as in the first except that the black is replaced by a tone of yellowish to dark brown and the pale frontal area is warmer and more restricted in extension. The third "untufted" species is the much-misconstrued *Cebus capucinus* of authors (not Linnaeus), or *Cebus nigrivittatus* Wagner. This is also a brown monkey but usually darker than the second, tending to blackish on the much smaller, wedge-shaped cap, middorsal line, hands, and feet. In addition, the contrastingly pale front of the first and second species is here much less, or hardly at all contrasting, and is extremely restricted in area. The "tufted" group is represented by a single species in Colombia, *Cebus apella* Linnaeus. It is doubtful if more than one species of "tufted" *Cebus* can be recognized at any one locality.

In his review of the Primates, Elliot (1913, p. 77) listed 24 forms of *Cebus*, of which 20 were given full specific rank. In his key Elliot sorted these into two major groups, "A. Head without tufts on male." and "B. Heads with tufts or ridges on male." Cranial characters exclusive of measurements were not used in the key or in any of the descriptions of recognized forms. This arrangement does not convey the true characters of the monkeys involved, nor does it necessarily correspond to established concepts of what constitutes a "tufted" or "untufted" species of *Cebus*. All forms listed by Elliot in his group "B" are indeed "tufted." However, his group "A" includes names of three truly "tufted" cebids, though the tufts may not have been obvious in the material examined by Elliot, or they may have been overlooked at the time he composed the key. The three are *Cebus apella*, *Cebus frontatus*, and *Cebus variegatus*. The type specimens of *frontatus* and *variegatus* were examined by the writer and found to be "tufted." Elliot's description, in the text, of each of these forms conforms to the definition of a "tufted" *Cebus* in spite of their inclusion in the "untufted" section of his key. The description and comparisons of *C. apella* given by Elliot (pp. 80–82) also show clearly that it is a tufted *Cebus*. On the other hand, Elliot's synonymy of *apella* is a composite of "tufted" and "untufted" cebids. His citations of synonyms of "tufted" monkeys include *apella* Erxleben, *fulvus* Kerr, *apella* Humboldt, *griseus* Desmarest, *apella* Wagner, *pucherani* [*sic*]

Dahlbom, *hypomelas* Pucheran, *annellatus* Gray, *fallax* Schlegel, and a number of general references. Elliot had examined whatever types existed of the above-named forms. "Untufted" forms included by Elliot in the synonymy of *apella* are *nigrivittatus* Wagner and *olivaceus* Schomburgk. Elliot did not see the types of either of these and he discussed only the second. His interpretation of the original description of *olivaceus* led him to believe that it was "tufted" and similar to *apella* and *fatuellus*, but nearer the first. From the foregoing it is evident that what Elliot described as *C. apella* and the types he actually examined and believed to be synonyms of *apella* are indeed "tufted" monkeys and may be designated as *Cebus apella*. On the other hand Elliot erred gravely in assuming that *Cebus capucinus* of authors (not Linnaeus) was equivalent to *Cebus apella*. These "authors" (discussed in the following section) painstakingly differentiated between the "tufted" monkey which they identified as *C. apella* and the brown "untufted" monkey which, for lack of any other available name, they termed *C. capucinus*. It should be understood that early authors based their identifications mainly on the 1766, or twelfth, edition of the "Systema Naturae" of Linnaeus and on the thirteenth, or Gmelin edition, of the Linnaean work. Since all other true cebids, namely, *apella*, *trepidus*, and *fatuellus*, of these editions are patently "tufted," authors settled upon *capucinus* (not *capucinus*, 1758) as representing the "untufted" form. As some of the specimens upon which these determinations were made are still extant, Elliot's opinion regarding the identity of *capucinus* of authors is unadvised and has created confusion that will long survive in some quarters.

In 1917 Cabrera published notes on *Cebus*. These documents were at the same time a critical review of Elliot's contributions to the same subject and an attempt to organize the components of the genus into a natural order. In this Cabrera succeeded in correcting the more serious errors into which Elliot had fallen and in offering a sound foundation, the first such, upon which to establish a clear understanding of the true relationships between the species of *Cebus*. In his paper Cabrera immediately affirmed the "tufted" nature of *Cebus apella* and disengaged from its synonymy the *Cebus capucinus* of authors. For the latter, Cabrera established the pertinency of the name *Cebus nigrivittatus* Wagner. Cabrera's classification of "untufted" cebids may be summarized as follows:

C. NIGRIVITTATUS GROUP

1. *Cebus nigrivittatus* Wagner
   Saï Buffon
   C. capucinus authors (*nec* Linnaeus)
   Sajou mâle Cuvier
   Saiou brun femelle Cuvier
   Cebus griscus F. Cuvier (*nec* Desmarest)

C. annellatus Gray [a "tufted" Cebus]
C. pucherani [*sic*] Dahlbom
C. paraguayanus Reichenbach (*nec* Fischer)
C. apiculatus Elliot
C. apella brunneus Allen

2. *Cebus olivaceus* Schomburgk
Saï variété B, Audebert
C. barbatus Desmarest (*nec* E. Geoffroy)
C. castaneus I. Geoffroy

C. ALBIFRONS GROUP

3. *Cebus albifrons* Humboldt
4. *Cebus gracilis* Spix
C. flavescens cuscinus Thomas
5. *Cebus chrysopus* [*sic*] Cuvier
6. *Cebus aequatorialis* Allen
7. *Cebus versicolor* Pucheran
C. leucocephalus Gray
8. *Cebus malitiosus* Elliot

"UNTUFTED" NOT REFERRED TO GROUP

9. *Cebus unicolor* Spix (specimens not seen)
C. flavescens Gray
10. *Simia flavia* Schreber (unidentifiable)
11. *Cebus flavus* Geoffroy (unidentifiable)
12. *Cebus barbatus* Geoffroy (unidentifiable)
13. *Cebus albus* Geoffroy (unidentifiable)
14. *Cebus fulvus* Desmarest

The black white-fronted monkey was, of course, determined as *Cebus capucinus* Linnaeus (1758). *C. hypoleucus* Humboldt was treated as a synonym of the typical form and the following as races: *limitaneus, imitator, nigripectus, curtus.*

Considerably more material available to this writer than to Cabrera has resulted in a consolidation of the 10 "untufted" species recognized as identifiable by Cabrera into the three species *nigrivittatus, albifrons* (with *unicolor*), and *capucinus*. *Cebus fulvus* Desmarest is untenable for reasons shown later.

The next significant attempt to classify members of the genus *Cebus* was made by Tate (1939). He distinguished the two principal categories of cebids, the crested ("tufted") and the uncrested ("untufted"). The last he divided into three groups, which are superficially equivalent to those of Cabrera and the three "untufted" species of this report. Unfortunately, Tate's choice of names and the actual forms he referred to his several groups allowed for little of the excellent and conscientious work done by Cabrera. Whereas Elliot correctly described *C. apella* as "tufted," though this is not apparent in his key, but incorrectly coupled that name with *capucinus* of authors, Tate arrived at the conclusion that *apella* was "untufted"

and thus, of necessity, equivalent to *capucinus* of authors. There is not the slightest foundation for this conclusion either in the very references cited by Tate or in what early authors have actually identified as *apella* and *capucinus*. The three groups of "untufted" cebids as arranged by Tate are summarized below. The equivalent nomenclature of this paper is shown in brackets.

Group 1, uncrested (Tate, 1939, pp. 211–213):

C. apella apella	[= *C. nigrivittatus castaneus*]
C. griseus Desmarest	[= "tufted" or *C. apella* Linnaeus]
C. apella olivaceus	[= *C. nigrivittatus olivaceus*]
C. apella apiculatus	[= *C. nigrivittatus apiculatus*]
C. apella brunneus	[= *C. nigrivittatus brunneus*]
C. apella malitiosus	[= *C. albifrons malitiosus*]
C. aequatorialis	[= *C. albifrons aequatorialis*]

Group 2, uncrested, "essentially Amazonian in distribution" (Tate, 1939, pp. 211–212): [in the order given] *albifrons, gracilis, leucocephalus* [not Amazonian], *versicolor* [not Amazonian], *unicolor* [all the preceding referrable to *albifrons*], *flavus* [unidentifiable], *castaneus* [a race of *nigrivittatus* and not Amazonian], *variegatus?* ["tufted," not Amazonian], *xanthosternos* ["tufted," not Amazonian], *robustus* ["tufted," not Amazonian], *cuscinus* [a race of *albifrons*]. On page 213, Tate listed *flavus* as a synonym of *albifrons* and, in addition to those mentioned above, added *barbatus, albus* [both unidentifiable], *variegatus* [without question mark], and *leucocephalus* Blainville [a *Pithecia*] as probably conspecific with *albifrons* "though representing in some cases geographical races." *Simia flavia* Schreber was mentioned as "not certainly identifiable as *Cebus*."

Group 3, uncrested, "Central American division" (Tate, p. 212), with the Colombian *nigripectus* [*capucinus*] and *chrysopus* [an *albifrons* of unknown origin but probably Amazonian].

The fourth or crested group of *Cebus* (Tate, p. 212) included species regarded as "probably best treated as subspecies of *fatuellus* Linnaeus." By rejecting the first valid name, *apella*, Tate might have adopted the specific name *trepidus* Linnaeus, which has priority over *fatuellus*. Instead he listed *trepidus* (p. 213) as a subspecies of *fatuellus*. The brown uncrested or "untufted" *Cebus nigrivittatus* Wagner was also included in his crested division (p. 212).

A revision of the genus *Cebus* presented as a doctoral thesis by Pusch (1941) is the ultimate in confusion. Nothing would be gained by reviewing the work here. References to Pusch's use of names for "untufted" cebids are made in the text and in the synonymies on later pages of this work.

The late Eladio da Cruz Lima (1945) has presented an excellent pictorial description of the Primates of Amazonia. His colored plates

are good reproductions of living animals in natural settings. With regard to *Cebus*, Cruz Lima (p. 136) found it divisable into "three groups which respectively correspond to the forms *apella*, *capucinus* of authors and *albifrons* of authors." He further remarked that "it is difficult and risky to establish fixed bases for the differentiation of these groups in view of the unknown ranges of individual variation, but any layman who knows the fauna of the Amazon is able to distinguish them at first sight by external appearance. To this end, a method much better than the most detailed descriptions which would necessarily be based on fluctuating characteristics, we publish three plates illustrating the three groups, having used as models living, fully adult specimens, each representing more or less the average form (*apella*, Plate XXII; *nigrivittatus*, Plate XXIII; *gracilis*, Plate XXIV)."

In the text Cruz Lima referred to the work of Elliot, Cabrera, and Tate. He confessed having received Tate's paper too late for critical comparison with his material. Consequently, he included unchanged many of Tate's decisions in his own monograph. Unfortunately, Cruz Lima attempted, either innocently or in a spirit of conciliation, to harmonize his own views with those of the mutually contradictory conclusions of Tate and Cabrera. The unhappy result is that both his key and classification of Amazonian cebids distort his own expressed concepts of the real divisions of *Cebus* and their true interrelationships. The cited plate of *Cebus apella* shows the same animal that Cruz Lima, in accepting Tate's classification, referred to as *fatuellus* in his section dealing with species and subspecies. He copied Tate further by listing *trepidus* as a subspecies of *fatuellus*. His key, which combines cranial characters given by Tate to distinguish "tufted" from "untufted" cebids, and external characters of these monkeys given by Cabrera, shows *apella* as "untufted"! *Cebus nigrivittatus*, correctly figured, is listed as a distinct species, but the key shows it to be "tufted"! *C. albifrons*, *unicolor*, and *gracilis* are each keyed correctly as "untufted" but are listed as distinct species. The figure of *gracilis* [=*C. albifrons unicolor*] shows its subspecific characters admirably well.

TAXONOMIC HISTORY OF "UNTUFTED" CEBIDS

Simia capucina Linnaeus (1758, p. 29). The description is indisputably that of an "untufted" *Cebus*. No locality was given, but *capucina* may be the black white-fronted *Cebus* of Central America and western Colombia and Ecuador. The color of the monkey as described and indicated in the wood cut cited by Linnaeus is too dark for any member of the *albifrons* group, while the form of the dark-colored portion of the crown excludes it as a member of the *nigrivittatus* group. Pucheran (1856, p. 34) attempted to identify this species, and Elliot (1907c, p. 227) repeated Pucheran's discussion. The conclusion

of both authors that *Simia capucina* is the black white-fronted cebid may be accepted. Their identification of Buffon's *saï à gorge blanche* and of Humboldt's *hypoleucus* with *S. capucina* is not valid, however.

Other described black white-fronted monkeys are now generally held to be either subspecies or synonyms of *C. capucinus*. These are *imitator* Thomas, *curtus* Bangs, *nigripectus* Elliot, and *limitaneus* Hollister.

Simia capucina Linnaeus (1766, p. 42). The primary reference is the same as for the *Simia capucina* of 1758, viz, "mus. Ad. Fr. 2, t. 2," but the diagnosis is modified and the habitat, Surinam, is added. The next reference is to Brisson's *sapajou brun* ("Regnum Animale," p. 193, 1756). The detailed description that follows has only a superficial resemblance to that of the *sapajou brun*, the original of which was in the museum of M. de Reaumur, in Paris. The Linnaean description may have been based on an actual specimen or, more probably, composed on the basis of mounted specimens and published descriptions. In its totality the 1766 description is certainly not that of the *Simia capucina* of 1758. In certain respects the secondary description could apply to the "tufted" *apella*. In other respects, chiefly by omissions, it could apply to the brown "untufted" monkey that was identified by early post-Linnaean authors as *Cebus capucinus* but that, because of the homonymity, should be known as *C. nigrivittatus*.

Elliot (1907c, p. 227) concerned himself with an attempt to identify the *Simia capucina* of 1766. He concluded that it was the same as *C. apella*, which according to his own description is clearly a "tufted" cebid. He was lamentably confused, however, in asserting that *C. apella* is the same that early authors had inappropriately identified as *C. capucinus*. As is shown in the discussions below, these authors, all more versed than Elliot in the zoology and taxonomy of American primates, had consistently identified the "tufted" *C. apella* as *C. apella* and, sometimes, as *C. fatuellus*, a synonym of *apella*. Thomas (1911, p. 128), in attempting to fix the basis for *C. apella*, referred to Elliot as authority for its identity with *capucinus* of authors. While it may be arbitrary to regard the *Simia capucina* of Linnaeus, 1766, as a synonym of *apella*, the identity of *C. capucinus* of authors with *C. apella* is wholly untenable.

Cebus capucinus Erxleben (1777, p. 48). The genus *Cebus* was here erected to accommodate several Neotropical species of primates including the cebоid *capucinus*, *apella*, *trepidus*, and *fatuellus*. Distinct genera were subsequently created for other species and the genus *Cebus* was left for those named above. No genotype was designated until Elliot (1907a, p. 560) did so by electing *Simia capucina* Linnaeus. The *capucinus* of Erxleben is a composite. It can be "tufted" or "untufted" and brown, black, or gray on back, head, tail, and limbs.

In the synonymy of *capucinus*, Erxleben cited the references to *Simia capucina* Linnaeus 1754 and 1758, as well as the 1766 version of *capucina* and numerous other citations to black, gray, and brown monkeys which he thought differed little, if at all, from *apella*, a "tufted" *Cebus*. However, Opinion 91 of the International Commission on Zoological Nomenclature, which placed "*Cebus* Erxl., 1777, 44, type *Simia capucina* Linn., 1758a, 29" in the official list of generic names, automatically restricts the identification of Erxleben's *capucinus*.

Cebus capucinus, of authors. Soon after the generic name *Cebus* was reserved for the species listed above (see *capucinus* Erxleben), the specific name *capucinus* was adopted, erroneously, for the dark brown "untufted" *Cebus* of the Guianas, Venezuela, and northern Brazil. Humboldt (1812, pp. 324–325) described this species, his "Matchi" of Caracas and Calabozo, under the name *Simia capucina* and distinguished it from the "tufted" *apella*. He was soon followed by E. Geoffroy (1812, p. 111), who also used the name *capucinus* for the dark brown "untufted" *Cebus*. Geoffroy included in the synonymy of *Cebus capucinus* the *Saï* of Buffon and of Audebert (fam. 5, sect. 2, pl. 4, 1797), both beyond a shadow of a doubt identical with the animal later described by Wagner as *C. nigrivittatus*. Cuvier (1820, p. 2, pl.) added an excellent colored figure of the dark brown "untufted" *Cebus* with the wedge-shaped coronal cap to the previous ones identified as *Cebus capucinus* by early post-Linnaean authors. Concerning this figure, the *sajou brun femelle*, Cuvier remarked, "C'est sans doute le *Simia capucina* des auteurs systématiques, si mon *Saï* est leur *Simia appella* [*sic*]." It is clear, however, that the name *capucinus* cannot be applied to the brown "untufted" *Cebus* of authors. Its use is restricted by the original description in 1758 to what is held to be the black white-fronted *Cebus*. It has already been shown, amply and repeatedly, by various authors that the *capucinus* of early post-Linnaean authors is equivalent to the conspecific *nigrivittatus* Wagner and *olivaceus* Schomburgk. This was first indicated by Pucheran (1856, p. 34), then by Schlegel (1876, p. 191), by Cabrera (1917a, p. 227), and finally by Bourdelle and Mathias (1928, p. 188). Again, Cabrera (1939, p. 19) reviewed the history of *capucinus* of authors and affirmed its identity with *C. nigrivittatus* Wagner. Cabrera has gone farther, however, in asserting that *Simia capucina* Linnaeus, 1766, not 1758, must be regarded as the genotype fixed by Elliot (1907a, p. 560). That *capucinus* Linnaeus, 1766, is the same as *capucinus* of early authors is debatable. The primary reference makes it a synonym of *capucinus*, 1758, The secondary reference makes it a homonym, if the animal described is at all identifiable. Elliot, in designating the type of the genus *Cebus* Erxleben, gave only "*Simia capucina* Linnaeus." In his synonymy of *capucinus* as the genotype

he cited Linnaeus, 1758, and Linnaeus, 1766. His other references (not known to Erxleben) make Elliot's *capucinus* a composite of all species of the genus. Erxleben also cited both Linnaean references. His description and synonymy of *capucinus* are equally vague and all inclusive. As Erxleben's *capucinus* has already been restricted (opinion 91) to the original Linnaean, or 1758, reference, it follows that the *capucinus* designated by Elliot as genotype must also be restricted to Erxleben's citation of the same reference, namely, *Simia capucina* Linnaeus, 1758.

Simia flavia Schreber (1774, pl. xxxib). The monkey is figured but not described in the text. The name may be the earliest available one for the *albifrons* group providing the figure could be positively identified as that of a *Cebus*. Except for its nearly white coronal cap, the figure might be identified with some of the paler representatives of the "untufted" group of *Cebus* such as *unicolor* and specimens at hand from dry areas of northern Colombia and from Trinidad. Nothing is known of the place of origin of the type specimen of *flavia*. In all probability the type was a menagerie animal, reared in captivity and with characters so abnormal, or so divergent from those of its nearest relatives in the wild state, that no justice would be done in attempting to compare it with other described forms or with normal individuals. It is here deemed best to agree with Cabrera (1917a, p. 232) in regarding *Simia flavia* as unidentifiable. It may be the same as *Cercopithecus flavus* Boddaert ("Elenchus Animalium," vol. 1, p. 59, 1784) said to be from "Guinea."

Cebus lugubris Erxleben (1777, p. 53). Described as "*Magnitudo Capucini Totus niger. Facies ferruginea, cum circumferentia usque in pedes anticos. Est in viuario Sereniss. Principis Hassiae, Cassellis. Mitis. A nemine descriptus, quantum video.*" Lesson (1840, p. 148) cited *lugubris* in the synonymy of "variété C," of *Cebus capucinus*. However, Erxleben's animal cannot certainly be identified with *C. capucinus* of Linnaeus or of authors, or even as a *Cebus*. Humboldt (1812, p. 335) had already recommended the suppression of the name *lugubris* (also *morta*, *trepida*, and *syrichta*) as unidentifiable.

S[imia] Sapajus capucinus albulus Kerr (1792, p. 78). Kerr's description of *capucinus* (*sensu stricto*) on the same page is that of a "tufted" *Cebus*, or *C. apella*, and *albulus* is said to agree with it in every respect except by its "having less hair around the face." The complete description of *albulus*, however, is a composite of "tufted" and brown "untufted" cebids. The latter element of the composition is attributable to Kerr's reference to the "Sai with a White Throat" described and figured in Smellie's translation of Buffon's Natural History. The original *saï à gorge blanche* of Buffon and Daubenton is a dark brown pale-fronted *Cebus*, almost certainly the same as *Simia*

hypoleuca Humboldt, an *albifrons* (see below). However, authors have heretofore regarded Buffon's (and Smellie's) monkey as a black white-fronted *Cebus* equivalent to *Cebus capucinus* Linnaeus, 1758. Thus, *Simia capucinus albulus* can be confused with any one of three distinct species of *Cebus*. It could be regarded as (1) a variety of *C. apella*, based on Kerr's concept of *capucinus*, (2) a brown pale-fronted *Cebus* (*albifrons*) based on the reference to the "Sai with a White Throat," and (3) a black white-fronted *Cebus* based on the misrepresentation of the *saï à gorge blanche* as such. To avoid this confusion, the name *albulus* is here restricted to Kerr's concept of the species *capucinus*. Hence, *albulus* is either a synonym of *C. apella* or unidentifiable.

The assumption that both the *saï à gorge blanche* and *Simia hypoleuca* Humboldt are black (*capucinus*) rather than brown (*albifrons*) monkeys led Allen (1895, p. 186) to consider *albulus* an earlier name for *hypoleucus*. Pusch (1941, p. 191) identified one black white-fronted *Cebus* from Cartagena, and others without locality data, as *C. capucinus albulus*. This is untenable as *albulus* is not only unidentifiable as a true *capucinus* but its habitat was originally stated to be Brazil. Furthermore, Cartagena is within the range Pusch had already assigned to the typical race of *C. capucinus*.

Cercopithecus flavus Goldfuss (Vergleichende Naturbeschreibung Säugethiere, Abt. 1, p. 74, 1809). The name was exhumed by Pusch (1941, p. 210) as representing a valid subspecies of the later described *albifrons* Humboldt. Pusch added *barbatus* Geoffroy, *Brissonii* Lesson, and "*flavescens* Reichenbach" to the synonymy of *flavus*, which he described as a uniformly pale monkey but with cap and back of head brown. Pusch had only a skull of a menagerie specimen of unknown origin on which to base identification, diagnosis, distribution (Guiana), and synonymy. Goldfuss' publication was not available, but Dr. Remington Kellogg kindly provided the writer with a copy of the original page containing the description of *Cercopithecus flavus*. Here *flavus* is shown as an emended form of the name for "Der Gelbe Halbaffe. *Simia flavia* v. Schreb. suppl. t.51.B." Goldfuss' entire description is derived from the colored plate cited (see *flavia* Schreber, above).

Simia albifrons Humboldt (1812, pp. 324–356). The name here adopted as the earliest valid one for the brown pale-fronted "untufted" *Cebus*. No specimen absolutely identifiable with *albifrons* has ever been recorded. This may be attributable to the absence of topotypes in any museum collection, to some vagaries in the original description, and to the nature of the individual, an animal reared as a pet, on which are based the main elements of the original description. Nevertheless, the original description and comparisons empha-

size the diagnostic characters of *albifrons* and render certain its identification and distinction from any other species of *Cebus*. Furthermore, the name *albifrons* is based on monkeys seen by Humboldt in their native habitat. Thus, it is mandatory to regard the brown pale-fronted *Cebus* of the upper Río Orinoco region as the typical representative of this widely distributed species.

Pusch's treatment of *albifrons* is novel. He gave its distribution as "Rio de Janeiro, Sao Paulo, Bahia." This range not only excludes the type locality but is wholly outside the range of the species. Pusch had no specimens of *albifrons*, but he listed as synonyms of it a miscellaneous collection of "tufted" cebids that have nothing in common with true *albifrons* apart from belonging to the same genus. Pusch's bases for distinguishing "*albifrons*" from all other species of *Cebus* were his observation that other monkeys "arch their backs like cats while *C. albifrons* always maintains its back stiff and straight. It does not seem to climb upward for any great distance. It prefers, instead, a position with its head uppermost. When not grasping anything, *C. apella* always supports itself with its hands while sitting. *C. albifrons*, on the contrary, prefers to lock its arms over its head while in a sitting posture. On the ground, *C. apella chacoensis* and *C. albifrons* walk with a quiet evenly paced gait, while the common *apella* (*griseus* group) scurries about restlessly with its back highly arched. The explanation for this may be that the latter species was better fed and the former feared its superior strength." These compelling arguments for distinction of the species concerned were based on the quoted author's notes on menagerie animals of unknown origins.

Simia hypoleuca Humboldt (1812, p. 336). The original description (reproduced in full under the subspecific heading in this report) is obviously that of a brown pale-fronted *Cebus* of the *albifrons* group. Nevertheless, *hypoleucus* has been considered by most authors as identical with the black white-fronted *C. capucinus* Linnaeus, 1758. This error in identification was initiated and perpetuated by authors who either failed to examine carefully the original description of *hypoleucus* or did not distinguish between the brown *capucinus* of authors and the black white-fronted *capucinus of* Linnaeus, 1758. E. Geoffroy (1812, p. 111) doubtfully referred *hypoleucus* (and Buffon's *saï à gorge blanche*) to his "*capucinus*," the brown species. Subsequent authors, notably Pucheran (1856, p. 34) and Elliot (1907c, p. 227), followed by indiscriminately regarding *hypoleucus* as identical with true *capucinus!* If Humboldt ever saw a true *Cebus capucinus* during the course of his travels in tropical America, he never revealed it in any of his numerous writings. He reviewed all species of *Cebus* known to him, and nowhere throughout the text of his accounts can be found any allusions to a black white-fronted monkey. All cebids described

by Humboldt are of some tone of brown on back and tail. He distinguished *C. apella* from *C. capucinus* of authors (*nigrivittatus*), and *albifrons* from these. The diagnosis of *hypoleucus* emphasizing the great extension of whitish on front of body (face, neck, chest, shoulder, inner and front sides of upper arm, and upper part of lower arm) was intended to distinguish this monkey from other species of the genus. Were *hypoleucus* black instead of brown on upperparts, that alone would have been sufficient for a diagnosis.

The alleged identity of *hypoleucus* with *C. capucinus* led Goldman (1914, p. 99) to fix the type locality of the latter upon that of the former. In doing so no inquiry was made into the true status of *hypoleucus*, and no evidence was produced that black white-fronted cebids really occur in the region of the mouth of the Río Sinú. No such evidence exists to this day, but it is highly probable that both black and brown cebids do occur there. This probability has, undoubtedly, contributed in large measure to the assumption that *hypoleucus* and *capucinus* are identical.

To be different, Pusch (1941, p. 191) recognized *hypoleucus* as a valid subspecies of *capucinus* Linnaeus. Its range, on the basis of localities of specimens he assigned to *hypoleucus* (such locality records and his "Verbreitung" and the distributional maps of the forms he recognized do not always agree), is essentially the same as the one he gave to typical *capucinus*. To emphasize impartiality in regarding *capucinus* and *hypoleucus* as races of equal status living happily side by side, Pusch listed the female type and paratype of *imitator* Thomas in the synonymy of the first, and the male paratype in the synonymy of the second. In the same spirit, he apportioned three specimens of a series of five collected by Watson in Boquete, Panamá, to *capucinus* and the remaining two specimens to *hypoleucus*. Pusch did record a hybrid, without locality, not of *hypoleucus* and *capucinus*, as might be expected, but, strange as it may seem, of *hypoleucus* and the middle Amazonian *gracilis*.

Cebus barbatus Humboldt (1812, p. 356). See discussion below, of *barbatus* Geoffroy.

Cebus fulvus Humboldt (1812, p. 356). See discussion, below, of *flavus* Geoffroy.

Cebus barbatus E. Geoffroy (1812, p. 110). On the basis of the original description alone, this form could be termed unidentifiable (*cf.* Cabrera, 1917a, p. 231). There is a mounted specimen in Paris, however, designated as the "type." It is No. 561 of the type catalog and No. 453 of the general collection of the Paris Museum (I. Geoffroy, 1851, p. 45; Rode, 1938, p. 231). The specimen was received through exchange from Temminck in 1812. The right side of body and tail is faded to dirty gray; on the left side the body is yellow, legs and

arms redder, tail dirty brown. The pelage is thick and curly. Seemingly the skin was not properly relaxed for mounting, and as a result the hair assumed curls and whorls that may have formed in the dry twisted and unprepared skin. The specimen is clearly that of an "untufted" *Cebus*, more probably of the *albifrons* than of the *nigrivittatus* group. It was said to have originated in the Guianas, but the specimen itself is without locality data. Geoffroy's synonymies make *barbatus* a composite species, since he cited the *sajou gris* of Buffon and Daubenton, a "tufted" *Cebus* (*C. apella*),[1] and the "*Saï Var.* A. Aud., *fam.* 5, sec. 2, fig. 6." The cited figure 6 belongs to the *Saï variété* B of Audebert, not *variété* A as given by Geoffroy. Cabrera (1917a, p. 227) identified the *saï variété* B of Audebert as *C. olivaceus*, here treated as a race of *C. nigrivittatus*. Desmarest (1820, p. 81) recognized the composite nature of Geoffroy's description and named the *sajou gris*, *Cebus griseus*. He then listed the restricted *C. barbatus* of Geoffroy with the reference to Audebert's figure 6, as a distinct species. This procedure appears justifiable, as neither the type specimen of *barbatus* nor the cited figure of Audebert is the same as the *sajou gris* of Buffon and Daubenton. Unfortunately, Desmarest's description is also composite. In addition to the *sajou gris*, he cited the *sajou mâle* of Cuvier (1819, pl.). This last is an "untufted" *Cebus* representing an extremely pale variety of *C. nigrivittatus*. The embroiled nomenclature of the above forms may be set forth more clearly in the following summary:

1. The lectotype of *C. barbatus* Geoffroy, perhaps from the Guianas, is an "untufted" *Cebus* but otherwise unidentifiable. Its name is preoccupied by *C. barbatus* Humboldt.

2. Humboldt cited only the *sajou gris* as a basis for the name *barbatus*. Consequently, *C. griseus* Desmarest, based primarily on the *sajou gris* of Buffon and Daubenton, is an absolute synonym of *barbatus* Humboldt and both are equal to *Cebus apella* Linnaeus. No locality for either *barbatus* or *griseus* was given.

3. If Kerr's names are valid, as they appear to be, then both *barbatus* Humboldt and *griseus* Desmarest are antedated by *Simia* (*Sapajus*) *trepidus fulvus*, based strictly on the *sajou gris*. Allen (1895, p. 186) has shown *fulvus* Kerr to be a synonym of *C. apella*.

Cebus flavus E. Geoffroy (1812, p. 111). This is probably an "untufted" *Cebus*. Beyond this, *flavus* is not certainly identifiable. The monkey, listed by Rode (1938, p. 231) as "Holotype," No. 562

[1] The original figure of the *sajou gris* (1767, pl. V) is hardly identifiable. The description (p. 50), however, states clearly one external character of the "tufted," or *apella* group, which is diagnostic, the black tipped hairs that "fermoit une bande sur chaque joue." In Buffon and Daubenton the *sajous* are equivalent to the "tufted" *Cebus*, the *saïs* to the "untufted." Cabrera (1917a, p. 231) also quoted the description, but at greater length, to prove that the *sajou gris* cannot be identified with *albifrons*, *olivaceus*, or *nigrivittatus*. Latreille (in Buffon, Hist. Nat., Sonnini ed., vol. 36, p. 280, 1804) saw the types of Buffon's *sajou gris* and *sajou brun* "vivans à la ménagerie du muséum français." He assigned both to his *Callithrix apella* (=*Simia apella* Linnaeus).

(458), was brought to the Paris Museum from Lisbon, presumably in its present state, a mounted specimen with skull in skin. The individual is extremely faded with considerable portions of hair of underparts, head and face missing. It is said to have originated in Brazil. Being based on an actual specimen, *flavus* Geoffroy is not strictly the same as *flavia* Schreber, though the latter was cited in the description of the former. *Cebus flavus* may be identical with *C. gracilis* (= *unicolor*), also from Brazil, as Wagner (1855, p. 90) suggested. In any case, the question remains whether the specimen determined as *flavus* by Geoffroy is to be regarded as a type or simply as a specimen referred to the amended form of the name *flavia* Schreber.

For some unknown reason the name *flavus*, or *flavia*, was prone to nomenclatorial accidents. Humboldt, in referring to Geoffroy's *flavus*, wrote it as "*Cebus fulvus*." This is a *nomen nudum*, as nothing that can be construed as a description accompanies this name, which appeared in published form a few months earlier than did the *flavus* of Geoffroy. Desmarest (1820, p. 83), because of a typographical error pointed out by I. Geoffroy (1851, p. 44), also listed *flavus* as *fulvus*. However, an earlier use of the name *fulvus* was made by Kerr (1792, p. 77), who described *Simia* (*Sapajus*) *trepidus fulvus*, a "tufted" *Cebus*. Elliot (1913, p. 93) used *flavus* Geoffroy to replace the name *barbatus*, which has priority over it, and Pusch (1941, p. 193) listed *flavus* Geoffroy as a synonym of *versicolor!*

Cebus albus E. Geoffroy (1812, p. 111). A complete albino. It was described as either a new species or as simply an albinistic variety. It has been variously considered a synonym of *flavus* and *barbatus*. Cabrera (1917a, p. 232) properly dismissed *albus* as unidentifiable.

Cebus griseus Desmarest (1820, p. 81). See discussion, above, of *barbatus* Geoffroy.

Cebus fulvus Desmarest (1820, p. 83). See discussion, above, of *flavus* Geoffroy.

Cebus unicolor Spix (1823, p. 7, pl. 4). Described from Teffé, Rio Solimões. The type is a male and, judged from the description and colored figure, is a member of the *albifrons* group.

Cebus gracilis Spix (1823, p. 8, pl. 5). From the same locality as *unicolor*. It is said to range from "la ville de Rio Negro vers le Perou." The description and figure of *gracilis*, apparently that of a female, differ little from those of *unicolor*. In fact, the differences are no greater than may be observed between two individuals of the same series but of different age and sex. Specimens recorded by Tate (1939, p. 213), from the upper Rio Negro and the Casiquiare, as *C. albifrons* show a remarkably close resemblance to both *gracilis* and *unicolor* and may be classified as *C. albifrons unicolor*. Authors have generally used the name *gracilis* instead of *unicolor* which has page priority, for the brown white-fronted *Cebus* of the Amazonian region.

Cebus chrysopus Lesson (1827, p. 55). Based on the "*sajou à pieds dorés ou chrysope*" of F. Cuvier (1825, pl., 2 pp.). The specific name "*Chrysopes*" as originally proposed by Cuvier (text, end of second page) is nonbinomial; hence the use of Lesson's *Cebus chrysopus* as the earliest acceptable designation. The original description was based on a living menagerie monkey that Cuvier was able to observe for a few days. The type was not preserved. It was said to have originated in "l'Amérique septentrionale." I. Geoffroy (1829, p. 150) recorded specimens of *Cebus*, collected by Plée, under the name *chrysopus*. Plée had done some collecting along the banks of the Río Magdalena, Colombia, and Geoffroy's description fits the available specimens of *Cebus* from the west bank of that river, opposite the mouth of the Río Cesar. These monkeys, however, differ in many respects from the description and colored figure of Cuvier's *sajou à pieds dorés*. Geoffroy was followed by others, notably Lesson (1838, p. 277), Schlegel (1876, p. 195), and Elliot, in referring the Plée specimens to *chrysopus* either as a distinct species or as a synonym of *C. albifrons*. Elliot listed the Plée specimens separately under *albifrons* and a few pages later (1913, p. 99) described them as representatives of *chrysopus*. Cabrera (1900, p. 78) and Lönnberg (1939, p. 23) saw some resemblance between specimens from the Amazonian region and the colored figure of the *sajou à pieds dorés*. Goeldi and Hagmann (1904, p. 48) synonymized both *chrysopus* and *gracilis* Spix (=*unicolor* Spix) with *Cebus albifrons* on the basis of specimens believed to have originated in the upper Amazonian region. In his review of the species of the genus *Cebus*, Cabrera (1917a, p. 229) finally decided that *chrysopus* was probably natural to the tropical Colombian fauna, perhaps of the Cauca-Magdalena Valley. It can now be stated categorically that no *Cebus* agreeing with the description of *chrysopus*, with ample allowances for individual variation, occurs in the Cauca-Magdalena Valley or elsewhere in Colombia from which specimens of the *albifrons* group are at hand. On the other hand, the original figure of *chrysopus* shows greatest resemblance to Amazonian specimens referred to *C. albifrons unicolor*. As it is unlikely that the menagerie animal representing *chrysopus* can ever be positively identified with any wild living representatives of *C. albifrons*, it is best to relegate provisionally that name to the synonymy of *unicolor*.

Cebus Brissonii Lesson (1840, p. 155). The first reference in the description is "*Simiolus ceylonicus*, Seba, t. 1, p. 77, pl. 48, fig. 3." Next is given the *Cercopithecus flavus* of Brisson (1762, p. 140) with the original Latin diagnosis quoted. These citations are followed by references to forms described or transcribed as *flava* [*sic*] Schreber, *flavus* Geoffrey, and *fulvus* Desmarest. The Seba and Brisson animals are probably the same, as Brisson also cited Seba. The monkey in

question may be a *Saimiri*. Humboldt (1812, p. 310) identified it as a *Pithecia*. In any case, *Cebus Brissonii* Lesson is preoccupied by *Cebus Brissonii* Fischer, 1829, an *Ateles*. Elliot (1913, p. 93) listed *brissonii* as a synonym of *Cebus flavus* Geoffroy, and Pusch (1941, p. 210) included it in the synonymy of "*C. albifrons flavus* Goldfuss."

Cebus versicolor Pucheran (1845, p. 335). Described as very nearly related to *chrysopus*. The type locality was given as "Santa-Fe de Bogota," Colombia. The name is applicable to the brown pale-fronted monkeys of the middle Río Magdalena Valley.

Cebus nigrivittatus Wagner (1848, p. 430). Based on specimens collected by Natterer and described by him in his unpublished notes. Pucheran (1857, p. 346) examined the type of *nigrivittatus* and compared it with *versicolor*. Schlegel (1876, p. 193), in discussing the identity and characters of "*Cebus capucinus* Geoffroy," indicated that *C. nigrivittatus*, as well as *castaneus* and *olivaceus*, is representative. The name *nigrivittatus*, adopted for the misnomer *capucinus* Linnaeus, 1766 (not 1758), may require revision if it can be shown that the conspecific *olivaceus* antedates it. Though frequently cited for the year 1847, the name *nigrivittatus* did not appear until 1848, the same year in which the description of *olivaceus* was published in the second volume of Schomburgk's "Reisen."

Both Schlegel (*op. cit.*) and Cabrera (1917a, p. 227; 1924, p. 131) considered the *sajou mâle* and the *sajou brun femelle* of Cuvier identical with *capucinus* of authors, or *nigrivittatus*. While the *sajou brun* is clearly the monkey known as *capucinus* of authors, the *sajou mâle* is difficult to identify with certainty. Its head, especially the form of the coronal cap, is like that of *nigrivittatus;* the color of the remainder of the body, however, resembles that of an *albifrons*. This composite appearance is actually a common occurrence among menagerie monkeys. Desmarest based the name *Cebus griseus* (*q. v.*) partially on the *sajou mâle* but primarily on the *sajou gris* of Buffon. Hence, the name *griseus* is not available for *capucinus* of authors. Reichenbach employed the name *paraguayanus* for the *sajou mâle*. However, Reichenbach's name is not only preoccupied by *paraguayanus* Fischer but is antedated by *nigrivittatus* Wagner as well. Pelzeln (1884, p. 11) identified *capucinus* of authors with *Cebus nigrivittatus* and added that the type of the latter was purchased from the Porocoto Indians in San Joaquim, upper Rio Branco.

Cebus olivaceus Schomburgk (1848, pp. 246, 247). As originally described, and as appears in a topotype from Mount Roraima, *olivaceus* is a local form of *C. nigrivittatus*. Cabrera (1917a, p. 227) believed it to be closely related but specifically distinct from *nigrivittatus*. He had no specimens and arrived at this conclusion indirectly by assuming that *olivaceus* was the same as the *saï variété* B of Audebert. This

last may be identified as a pale race of *nigrivittatus* not necessarily *olivaceus*. Pucheran (1856, p. 34), in attempting to identify *capucinus* of authors, not Linnaeus, concluded that it was equivalent to *olivaceus*. He also called attention to the figure of "*olivaceus*" given by Wagner in supplementary volume 5 (1855, pl. 8), which he believed to be the same as *C. castaneus* I. Geoffroy. The figure in question is that of a pale representative of *nigrivittatus*, "angeblich aus Colombien." Later, Pucheran (1857, pp. 345, 352) modified his opinion. He thought, instead, that *olivaceus* and *castaneus* were the same but distinct from *capucinus* of authors (*nigrivittatus*). This reversal appears to have been a friendly gesture to Dahlbom, who had already bestowed the name *pucheranii* (*q. v.*) upon the *capucinus* of authors. The name *olivaceus* was published in the same year as *nigrivittatus*.

Cebus castaneus I. Geoffroy (1851, p. 46). A representative of *nigrivittatus* nearest, perhaps, to *olivaceus*. The type, sent from Cayenne in 1819, was mounted and now is in very poor condition. On the assumption that the monkey originated somewhere along the coast of French Guiana, it could hardly be synonymized with *olivaceus*, which, according to Schomburgk, does not occur anywhere below 3,000 feet in the Mount Roraima region. It most probably is the same as the British Guianan *Cebus* identified by Elliot and by Tate as *Cebus apella apella*.

Cebus Pucheranii Dahlbom (1856, pp. 161, 165). A new name for the "Ce. capucinus Is. Geoff. St. Hil. non Linnaei. America meridionalis." The name was proposed in honor of Pucheran, who "Simian capucinum Lin. a Cebo capucino Is. Geoffr. primus rite distinxit." References to Pucheran's views are given in the above discussions of *capucinus* and *olivaceus*. This last name, and *nigrivittatus*, have priority over *pucheranii* for *capucinus* of authors. It will be noted, incidentally, that the description of *pucheranii* is included by Dahlbom in his "tufted" group. Hence, the name is in no case valid for that part of *capucinus* I. Geoffroy which is of authors but could apply to the three "tufted" menagerie specimens listed by I. Geoffroy (1851, p. 46) under the name *capucinus*.

Cebus paraguayanus Reichenbach (1862, p. 41, fig. 118). The description and figure are based on the brown "untufted" *sajou mâle* of Cuvier, while the name is taken from Fischer's *Cebus apella paraguayanus*, equivalent to Azara's "cay," a "tufted" form. Cabrera (1939, p. 34) discussed this subject fully showing the untenability of the name proposed by Reichenbach.

Cebus leucocephalus Gray (1865, p. 827, fig. 4). A member of the *albifrons* group and generally considered a synonym of *versicolor*. However, *leucocephalus* is distinctly darker than *versicolor* and, apparently, representative of the dark brown *albifrons* of northeastern

Colombia and western Venezuela. This has been shown by Osgood (1910, p. 32). Additional material together with the writer's notes on the type bear out Osgood's conclusions. The "*leucocephalus* Blainville" cited by Elliot (1913, p. 88) and by Tate (1939, p. 214) as conspecific with *Cebus albifrons* is *Pithecia leucocephala* Geoffroy and not *Cebus leucocephalus* Gray.

Cebus flavescens Gray (1865, p. 827). Elliot (1913, p. 91) disposed of the name *flavescens* in the synonymy of *unicolor*, and there is no reason for disputing his argument for doing so. Thomas (1901, p. 180) declared that "there seems to be some evidence that it [*flavescens*] has been obtained by Wallace on the Rio Negro."

Cebus flavescens cuscinus Thomas (1901, p. 179). The southernmost representative of the *albifrons* group.

Cebus apiculatus Elliot (1907b, p. 292). A possibly valid race of *nigrivittatus*.

Cebus malitiosus Elliot (1907c, p. 230). A dark race of *albifrons*.

Cebus apella brunneus Allen (1914, p. 653). A weakly differentiated race of *nigrivittatus*.

Cebus aequatorialis Allen (1914, p. 654). A subspecies of *albifrons*.

Cebus capucinus trinitatis Pusch (1941, p. 194). A valid insular race of *C. albifrons*.

Cebus capucinus leporinus Pusch (1941, p. 195). A new name proposed for *Cebus nigrivittatus* Wagner "preoccupied" by *Chrysothrix nigrivittatus* Wagner. The latter is a *Saimiri*, a genus that Pusch recklessly lumped with *Cebus*. As this system of classification is not adhered to in this report, *leporinus* revolves to the synonymy of *nigrivittatus*.

SUMMARY OF NAMES DISCUSSED, WITH A LIST OF RECOGNIZABLE SPECIES AND SUBSPECIES

UNIDENTIFIABLE

Simia capucina Linnaeus, 1766—also a homonym of *capucina* Linnaeus, 1758; designated as genotype of *Sapajus* Kerr, by Kellogg and Goldman (1944, p. 2).[2]

Simia flavia Schreber, 1774.

Cebus lugubris Erxleben, 1777.

Cercopithecus flavus Goldfuss, 1809—same as *flavia* Schreber, emended. Also preoccupied by *Cercopithecus flavus* Boddaert, 1784.

Simia capucinus albulus Kerr, 1792.

Cebus barbatus Geoffroy, 1812—also a homonym of *barbatus* Humboldt, 1812.

Cebus flavus Geoffroy, 1812—same as *flavia* Schreber emended?

Cebus albus Geoffroy, 1812.

[2] *Cebus apella* Linnaeus had already been designated as genotype of *Sapajus* Kerr, by Pusch (1941, p. 197).

Cebus fulvus Humboldt, 1812—*nomen nudum*, also preoccupied by *fulvus* Kerr.

Cebus fulvus Desmarest, 1820—*lapsus calami* for *flavus* Geoffroy, also preoccupied by *fulvus* Kerr.

Cebus Brissonii Lesson, 1840—also a homonym of *Cebus Brissonii* Fischer, an *Ateles*.

"TUFTED" CEBIDS FREQUENTLY IDENTIFIED AS "UNTUFTED"

Sajou gris, Buffon and Daubenton, 1767.

Simia capucinus albulus Kerr, 1792—if identifiable, a synonym of *Cebus apella*.

Cebus barbatus Humboldt, 1812—antedated by *fulvus* Kerr, a synonym of *C. apella*.

Cebus griseus Desmarest, 1820—antedated by *barbatus* Humboldt and *fulvus* Kerr, all based on the *sajou gris*.

Cebus Pucheranii Dahlbom, 1856.

FIGURE 53.—Type localities of the nominal subspecies of *Cebus capucinus* (circles) and of *Cebus nigrivittatus* (squares). See text for names of localities and distribution of the species.

CEBUS CAPUCINUS Linnaeus

Simia capucina LINNAEUS, 1758 (not 1766)—genotype of *Cebus* Erxleben, by opinion 91, International Commission on Zoological Nomenclature.

Cebus capucinus, Erxleben, 1777—identity automatically restricted by opinion 91.

Simia capucina v[ariété] a, Audebert, 1797, fam. 5, sect. 2, pl. 5. (*Le Saï à gorge blanche variété* A.)

Cebus hypoleucus, auctorum (*nec* Humboldt).

Cebus capucinus albulus, Pusch (*nec* Kerr).

Distribution (map, fig. 53).—From Honduras south into western Colombia and western Ecuador.

None of the distinguishing characters attributed to the described

races of *C. capucinus* appears to be valid. It is desirable, however, to retain these named subdivisions of the species pending a thorough study of ample material. The following subspecies, with their type localities given, are tentatively recognized:

CEBUS CAPUCINUS CAPUCINUS Linnaeus

Simia capucina LINNAEUS, Systema naturae, ed. 10, p. 29, 1758.

Type locality.—Unknown. Fixed by Goldman (1914, p. 99) on that of *hypoleucus* Humboldt, or "northern Colombia." Actually the type locality of *hypoleucus* is the region about the mouth of the Río Sinú. Until it can be positively ascertained, however, that true *capucinus* does occur at the Sinú, the broader restriction to "northern Colombia" should be the one accepted.

CEBUS CAPUCINUS CURTUS Bangs

Cebus curtus BANGS, Bull. Mus. Comp. Zool., vol. 46, p. 91, 1905.

Type locality.—Gorgona Island, Colombia.

CEBUS CAPUCINUS NIGRIPECTUS Elliot

Cebus capucinus nigripectus ELLIOT, Bull. Amer. Mus. Nat. Hist., vol. 26, p. 229, 1909.

Type locality.—Originally given as "Las Pubas, Cauca Valley, Colombia." The type specimen was collected June 13, 1898, by J. H. Batty at Pavas, on the western slope of the Cordillera Occidental between Cali and Buenaventura, Department of Valle del Cauca, altitude 4,500 feet.

CEBUS CAPUCINUS IMITATOR Thomas

Cebus imitator THOMAS, Ann. Mag. Nat. Hist., ser. 7, vol. 11, p. 376, 1903.

Type locality.—Boquete, Chiriquí, Panamá.

CEBUS CAPUCINUS LIMITANEUS Hollister

Cebus capucinus limitaneus HOLLISTER, Proc. Biol. Soc. Washington, vol. 27, p. 105, 1914.

Type locality.—Originally given as "Segovia River, eastern Honduras." The Río Segovia (or Wanks) flows between northern Nicaragua and southeastern Honduras. The type specimen was collected in 1887 by C. H. Townsend, who touched the coast of Honduras at points including Trujillo, Patuca, and the mouth of the Río Segovia. Accordingly, the type locality of *Cebus capucinus limitaneus* is here restricted to Cabo Gracias a Dios at the mouth of the Río Segovia, eastern border between Honduras and Nicaragua.

CEBUS NIGRIVITTATUS Wagner

Saï BUFFON, 1767.

Simia capucina, AUDEBERT, 1797 (*nec* Linnaeus), fam. 5, sect. 2, pl. 4 (*Le Saï*).

Simia capucina v. B. AUDEBERT, 1797, fam. 5, sect. 2, pl. 6 (*Le Saï Variété* B).

Sajou mâle, CUVIER, 1824, livr. 12, pl., November 1819 (*Cebus griseus* F. Cuvier).
Sajou brun femelle, CUVIER, 1824, livr. 16, pl., May 1820.
Cebus capucinus, auctorum (Humboldt, Geoffroy, Cuvier, Pucheran, Schlegel, etc., not Linnaeus).
Cebus nigrivittatus WAGNER, 1848; Schlegel, Pelzeln, Cabrera, Bourdelle, and Mathias.
Cebus olivaceus SCHOMBURGK, 1848.
Cebus castaneus I. GEOFFROY, 1851.
Cebus paraguayanus REICHENBACH, 1862.
Cebus apiculatus ELLIOT, 1907.
Cebus apella, ELLIOT, 1913, part (references to any of above in synonymy of *apella*).
Cebus apella brunneus ALLEN, 1914.
Cebus apella, TATE, 1939, part (*apella, olivaceus, apiculatus*, and *brunneus*).
Cebus capucinus, PUSCH, 1941, part (*olivaceus, leporinus*).

Distribution (map, fig. 53).—Venezuela, the Guianas, and in Brazil the territory embraced by the lower Amazonas and the Rio Negro.

The following subspecies of *Cebus nigrivittatus* are provisionally recognized:

CEBUS NIGRIVITTATUS NIGRIVITTATUS Wagner

Cebus nigrivittatus WAGNER, Abh. math.-phys. Cl. bayer. Akad. Wiss., vol. 5, p. 430, 1848.

Type locality.—San Joaquim, upper Rio Branco, Amazonas, Brazil.

Remarks.—The *Saï* of Buffon and Audebert and the *sajou brun femelle* of Cuvier probably represent the typical form. *C. capucinus leporinus* Pusch is a synonym.

CEBUS NIGRIVITTATUS OLIVACEUS Schomburgk

Cebus olivaceus SCHOMBURGK, Reisen in British-Guiana, vol. 2, p. 246 (description), p. 247 (name), 1848.

Type locality.—Vicinity of "Our Village," said to be situated at latitude 4°57′ N., 61°1′ W., altitude 3,100 feet above sea level, southern foot of Mount Roraima, Venezuela. The locality may be the same as Paulo, 7 miles southwest of the cliffs of Roraima.

CEBUS NIGRIVITTATUS CASTANEUS I. Geoffroy

Cebus castaneus I. GEOFFROY, Cat. Meth. Coll. Mamm. Coll. Oiseaux, Coll. Annexes, Paris, p. 46, 1851.

Type locality.—Cayenne, French Guiana.

Remarks.—*Le Saï variété B* of Audebert agrees most with the type. Specimens from British Guiana recorded by Tate as *Cebus apella* average darker but are best assigned to *castaneus*.

CEBUS NIGRIVITTATUS APICULATUS Elliot

Cebus apiculatus ELLIOT, Ann. Mag. Nat. Hist., ser. 7, vol. 20, p. 292, 1907.

Type locality.—La Unión, Río Caura, near its confluence with the Orinoco, Venezuela.

CEBUS NIGRIVITTATUS BRUNNEUS Allen

Cebus apella brunneus Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 653, 1914.

Type locality.—Aroa (Pueblo Nuevo), station on the Bolívar Railway, Yaracuy, northwestern Venezuela, altitude 730 feet.

Remarks.—One specimen (U.S.N.M. No. 261319) from the París Peninsula, Venezuela, is distinctly paler and resembles more nearly the figure of the *Sajou mâle* of Cuvier than any other specimen examined.

CEBUS ALBIFRONS Humboldt

Saï à gorge blanche Buffon (*nec auctorum*).
Simia albifrons Humboldt, 1812.
Simia hypoleuca Humboldt, 1812 (*nec auctorum*).
Cebus unicolor Spix, 1823.
Cebus gracilis Spix, 1823.
Sajou à pieds dorés or "*Chrysopes*" Cuvier, 1825.
Cebus chrysopus Lesson, 1827.
Cebus versicolor Pucheran, 1845.
Cebus leucocephalus Gray, 1865.
Cebus flavescens Gray, 1865.
Cebus flavescens cuscinus Thomas, 1901.
Cebus malitiosus Elliot, 1907.
Cebus aequatorialis Allen, 1914.
Cebus capucinus trinitatis Pusch, 1941.
(Other synonymies given in the subspecies accounts.)

Distribution (map, fig. 54).—Amazonian region of Brazil, Colombia, Venezuela, Ecuador, and Peru; banks of upper Río Orinoco and the Lake Maracaibo drainage basin in Venezuela and Colombia; lower Sinú, Ranchería, and Cauca-Magdalena drainage areas of Colombia; Pacific drainage areas of northwestern Ecuador; island of Trinidad. Altitudinal range from sea level to not over 2,000 meters above.

There is no evidence that members of the species exist in northern Venezuela outside the Lake Maracaibo Basin. Micos of this area may be regarded as representing an extension of range of the fraction of the species occupying the Cauca-Magdalena and Ranchería drainage areas of Colombia. *C. albifrons leucocephalus* has a trans-Andean distribution. It ranges from the Río Zulia, an affluent of Lake Maracaibo, across the Cordillera Oriental to the Magdalena Valley. The race of the eastern base of the Sierra de Perijá, Venezuela, probably grades into *malitiosus* of the Sierra Nevada de Santa Marta, Colombia. Immediately south of where the range of these two forms may meet is the region of the Río Cesar, inhabited by a third race. So far as available records show, there is no contiguity between the range of that part of the species mentioned above and that of representatives of the species known to occur in the upper Río Orinoco and in the Amazonian regions. Nevertheless, the former must have been derived from the latter, and the distributional gap may be more

apparent than real. Little or no collecting has been done in most of the area representing the hiatus. The insular *C. a. trinitatis* is completely cut off from its relatives by the northern portion of Venezuela. It may have been introduced into Trinidad from Brazil or from the interior of Venezuela or Colombia. *C. a. aequatorialis* of western Ecuador is also, apparently, a completely isolated race. However, a continuous distribution of the species along the coast of western Colombia between the type localities of *aequatorialis* and *hypoleucus* of northern Colombia may be postulated. If this assumption proves wrong, the probability of an erstwhile low elevation trans-Andean continuity of range between *aequatorialis* and upper Amazonian representatives of *albifrons* must be considered. In spite of the broken distributional pattern of the species, physical characters of the forms referred to *albifrons* are such as to leave no doubt of their conspecificity.

Coloration.—Face with light down of brown to silvery hairs, longer hairs sparsely covering upper lip; cheeks and point of chin white to cinnamon. Superciliary region broadly whitish to cinnamon, the color extending round sides of face, encircling ears and continuous with white or ochraceous of throat, sides and ventral surface of neck, upper portion of chest, and part of shoulder. In males, and females without frontal diadem, cap grayish brown to dark brown, usually darker than median dorsal area, broadly outlined in front and often with a median point or line extending across whitish superciliary region. Back from Light Ochraceous-Buff to reddish brown, the hairs usually without sharply contrasted annulations or distinct subterminal banding; median dorsal region usually warmer or darker than sides of back. Lateral fringe like side or middle of back. Lower part of chest and belly sparsely haired yellowish to reddish. Color of upper arm like adjacent regions of shoulder, neck and side of trunk; forearm drab or yellowish to reddish brown, the hairs paler basally, frequently broadly paler or silvery apically, creating a "hoar-frosted" effect. Hands above grayish to dark brown, not black. Thighs like adjacent parts of body; forelegs and feet like forearms and hands. Upper proximal portion of tail like median dorsal region, or "hoar-frosted," terminally paler, undersurface like sides of back proximally, terminally paler, becoming yellowish or whitish.

Variations.—The subspecies are differentiated on the basis of color and color pattern; color of limbs, especially in relationship to that of the trunk, is one of the more important diagnostic characters. These characters are fairly constant in any one series of adults irrespective of age and sex. Usually subadults and young individuals show paler tones of the same colors distributed in approximately the same way as in adults. Sexual differences and what appear to be light and dark

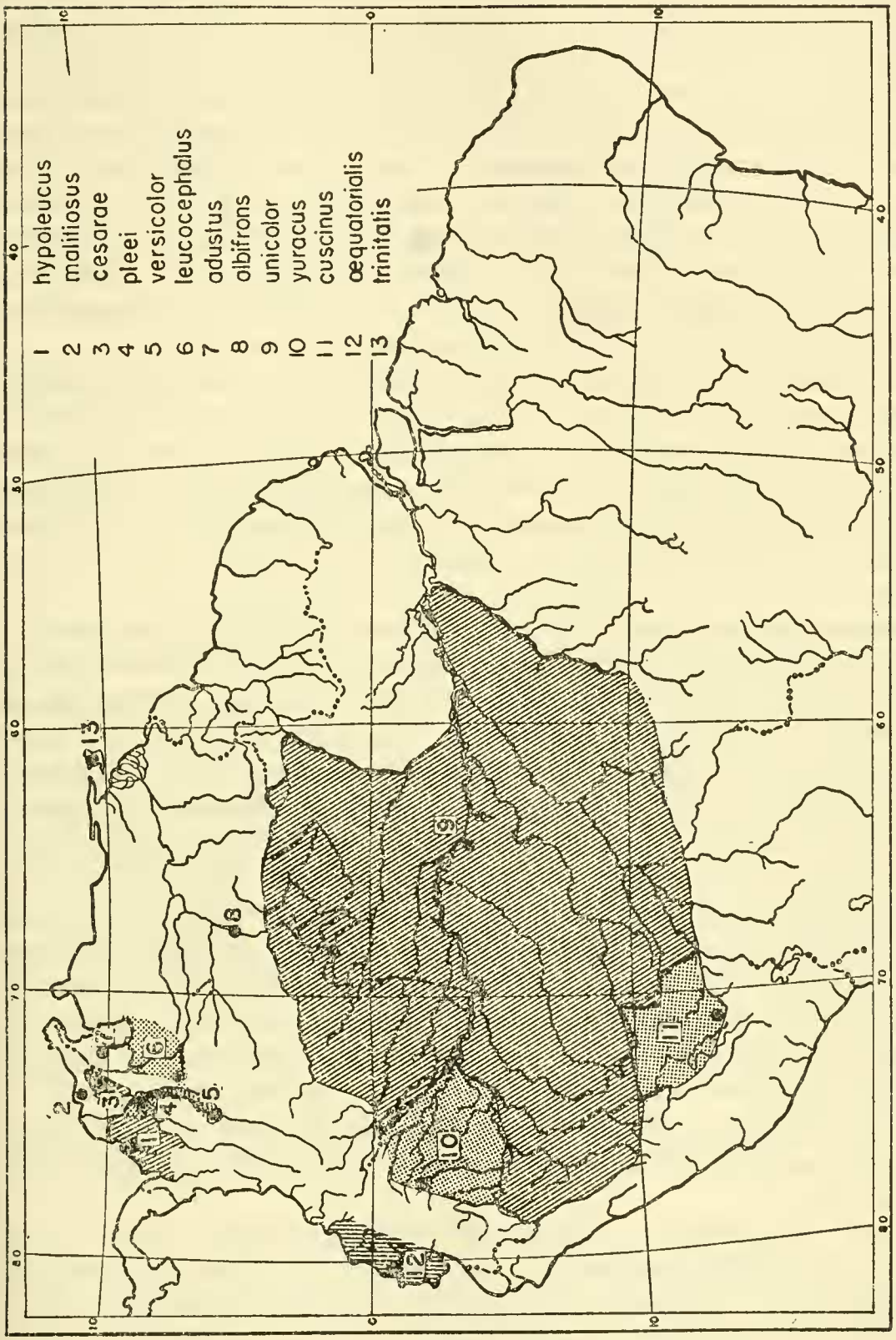

FIGURE 54.—Distribution of *Cebus albifrons*. Range shown for each of the subspecies is a rough approximation. Black circles indicate positions of type localities.

color phases in any one series are strictly comparable with such differences in any other series. Descriptions of coloration of the races are based on the superficial aspects of individuals. The terminal halves of the hairs, usually consisting of one, sometimes two, color bands, are described as determining the color of the individual or population. The color of the basal halves of the hairs, which normally grade into the color of the terminal or subterminal portions, is so variable in any one individual as well as series that it has been completely discounted for diagnostic and even descriptive purposes. Group assemblages known as bands or clans have each some distinctive character which sets them off from other populations. In the absence of samples of intergrading populations, it is difficult to assess the characters which unite clans into geographic races.

External measurements and cranial characters reveal nothing to aid in distinguishing the races. Here factors of age and sex obscure whatever diagnostic differences may exist. Reduction of the mass of available material into comparable individuals yields too few specimens for satisfactory analyses of cranial characters. What does appear is that differences in size and cranial parts are entirely individual.

Present material reveals no indication of geographic gradients or clines, or any close or consistent correlation between coloration of the various populations and their respective habitats. Often representatives of the same species occupying opposing banks of a river where ecological conditions are identical may prove to be subspecifically distinct. There does appear to be some seasonal differences in color. Micos tend to be paler during the dry season than in the rainy season. Generally, however, the paler color is associated with old pelage and the darker, or warmer, color with new pelage. It cannot be determined now what part, if any, of these differences in color may be related to external factors and what part to the simple coincidence of the cycle of pelage change with seasonal changes. In any attempt to determine geographic gradients, it must be borne in mind that members of the genus *Cebus* are among the most mobile of American simians. Their wanderings and migrations cover more territory and diversities of ecological situations than is commonly supposed.

Sexual dimorphism.—There are obvious cranial differences between sexes. The skull of the adult male is larger and more heavily built throughout. Temporal crests, weakly developed in the species, are slightly better defined in males than in females; the frontal region of adult females shows the same slight vaulting noted in subadult males; orbital rings of females never attain the thickness of those of males; canines and lower first premolars of males much more developed. In males the upper canine projects more than 12 mm.

from alveolar rim or more than two and one-half times the corresponding length of the first premolar; in females the upper canine projects 10 mm. or less and is less than twice the corresponding length of the adjacent premolar.

Externally, partial dimorphism distinguishes many individuals of one sex from the other. A majority of females depart from the normal condition of a broad, pale superciliary band consisting of short, smoothly adpressed hairs. In these females a few to all hairs of forehead are comparatively long and erected in the form of a superciliary tuft or frontal diadem (fig. 52, *b*). Color of these hairs may be whitish to brown like cap. A dark forehead without tufts is noted in a few females. No exception to the condition of forehead described as normal has been noted among males. Generally, color of upper surface of tail is a continuation of that of median dorsal area where individual hairs are not banded terminally and subterminally with markedly contrasting colors. In a large percentage of males, terminal portions of hairs of upper surface of tail are buffy or pale yellowish and contrast sharply with the dark brown or reddish subterminal bands. This effects a "hoar-frosted" appearance on surface of tail. Tails of females do not exhibit definite hoar-frosting.

In the following tabulation the number of individuals with each of the various aspects of forehead and tail are summarized. Only specimens captured in the field are listed.

Males, normal	33
Males, with hoar-frosted tails	22
Females, normal, with broad, pale superciliary band	17
Females, with white frontal tufts	9
Females, with brown frontal tufts	14
Females, with brown untufted foreheads	2

No sharp line divides the four categories of females. The number given for normal females includes all those with foreheads as in males plus a number with incipient tufts and pale tones of brown. There is a gradual transition from white to brown tufted females. Pelage of forehead of the two brown untufted females is long and lax and may be erectile. Similarly, normal males grade into those with hoar-frosted tails. Males with questionably hoar-frosted tails have been listed as normal.

Superciliary tufts or frontal diadems appear also in many females of *C. capucinus* and *C. nigrivittatus*. Tufts of "untufted" species of *Cebus* consist of erect hairs of the superciliary region usually restricted to the forehead but sometimes extending for a very short distance over part of crown. In the latter case, a distinctly darker cap is usually absent. In true "tufted" species (*C. apella*) tufts are normally erect hairs of the coronal cap, not of the superciliary band.

Dental anomalies.—In material examined, two males and one female

lack both upper third molars. Two males and one female lack only the left upper third molar. One male (U. S. N. M. No. 281602) has an additional upper premolar in each jaw. This tooth lies between what are apparently quite normal first and second premolars. The supernumerary is in line with the longitudinal axis of the other molariform teeth but its crown is little more than half the width of the second premolar and shows considerably more wear. It occludes with the first and second lower premolars thus functionally replacing the first upper premolar which is unworn.

CEBUS ALBIFRONS HYPOLEUCUS Humboldt

(*Cf.* p. 338 for nomenclatorial discussion)

Saï à gorge blanche BUFFON, Histoire naturelle, générale et particulière avec la description du cabinet du Roi, Paris, vol. 15, p. 64, pl. 9, 1767.

Simia hypoleuca HUMBOLDT (*nec auctorum*), Recueil d'observations de zoologie et d'anatomie comparée, vol. 1, pp. 337, 356, 1812.

Holotype.—None preserved. Name and description based on individuals observed within their natural geographic range.

Type locality.—"Habite les rives du Rio Sinu et probablement aussi la Guyane françoise" (*op. cit.*, p. 356). Now restricted to the region about the mouth of the Río Sinú, Bolívar Department, Colombia.

Distribution.—Quoting Humboldt (*op. cit.*, p. 336), "Nous avons vu pour la première fois ce singe à l'embouchure du Rio Sinù, dans une cabane, près du Zapote [Bahía de Zispatá, east of the mouth of the Sinú]. Les mulâtres et les Zambos, qui se sont établis dans cet endroit sauvage, nous ont assuré que le Cariblanco étoit commun dans les belles forêts de palmiers qui s'étendent depuis le Sinù jusqu'au golfe de Darien. Nous en avons aussi rencontré plusieurs individus à Turbaco [near Cartagena], dans les maisons des Indiens."

Characters.—"*Ex fusco nigra, facie, collo, pectore, humeris et brachiis (haud antibrachiis) ex albo flavescentibus.*

"*Cauda fusco-rubra, prehensilis, longitudine corporis. Facies nuda, albida. Ungues plani. Digiti subnudi. Aures ex albo flavicantes.*

"Le *Cariblanco du Rio Sinu* a 0.35 m. (13 pouces) de long, depuis le front jusqu'à l'origine de la queue: c'est un singe très-doux et très-agile. Il a le port du Matchi vulgaire [*Cebus nigrivittatus*] ou Sajou [*Cebus apella*]: il pousse sans cesse un cri plaintif, en sifflant et en ridant le front. Son pelage est d'un brun noirâtre; mais la face, dégarnie de poils, les oreilles, le col, les épaules, la poitrine et l'avant-bras sont d'un blanc sale tirant sur le jaune. La queue prenante, qui a la longueur du corps, est d'un brun rougeâtre. Les Indiens m'ont assuré que le Simia hypoleuca parcourt les forêts par bandes très-nombreuses, et que ces bandes se tiennent séparées de celles des Matchis vulgaires. Cette circonstance me confirme dans l'opinion que ce singe n'est pas une variété du Simia apella ou du S. capucina des auteurs. Il diffère de ces dernières espèces par la couleur de la face, des épaules et de

Front view of skulls of adult male *Cebus* (natural size): *a*, *Cebus albifrons*, from northern Colombia; *b*, *C. apella*, from Paraná, Brazil.

Ventral aspects of skulls of adult male *Cebus* (natural size): *a*, *Cebus albifrons*, from northern Colombia; *b*, *C. apella*, from Paraná, Brazil.

la poitrine, qui ne sont pas d'un fauve pâle, mais d'un blanc très-clair, quoique un peu jaunâtre; et par le sommet de la tête, qui n'offre ni une calotte plus noire que le pelage du dos, ni une strie qui descend longitudinalement vers le front."

Remarks.—According to Humboldt, characters separating *hypoleucus* from other species of *Cebus* are "[*transl.*] the color of the face, shoulders and chest which are not pale tawny [as in the others] but of a very pure white, though a little yellowish; the cap of the crown which is not darker than the pelage of the back, and the absence of a stripe descending longitudinally on the forehead." Thus if it were not definitely expressed, it would be implicit that in other respects *hypoleucus* is brownish like the others. Mention of absence of a frontal stripe was intended to further distinguish *hypoleucus* from *albifrons*. This last, however, is a variable character and of no diagnostic value. The probability cited by Humboldt that *hypoleucus* may occur also in French Guiana excludes *Cebus capucinus* from consideration. It appears, then, that *hypoleucus* is a dark brown form of *albifrons*, with little if any contrast between color of back and forearms and forelegs, and most nearly resembles *malitiosus*.

The type locality of *hypoleucus* lies between the ranges of *malitiosus* and *pleei* (*nomen novum*, Río Magdalena) and of *Cebus capucinus* (Río Atrato and Panamá). It is highly probable, therefore, that both brown and black white-fronted cebids occur in the region of the Río Sinú. The Indians who reported to Humboldt that *hypoleucus* maintained itself apart from another species of monkeys may have been referring to true *Cebus capucinus*. Humboldt thought it was the "*Matchi vulgaire*," or *Cebus nigrivittatus*. This species, however, does not range west of the Andes.

The local name *cariblanco* adopted by Humboldt for *Cebus hypoleucus* is indiscriminately applied by Colombians to both *C. capucinus* and *C. albifrons*. The French collector Plée labeled his Colombian specimens of *C. albifrons* "carita blanca." The more generally used native name for "untufted" cebids is mico. Humboldt is followed in listing Buffon's *saï à gorge blanche* in the synonymy of *hypoleucus*.

Specimens examined.—None.

CEBUS ALBIFRONS MALITIOSUS Elliot

Cebus capucinus, Allen (*nec* Linnaeus), Bull. Amer. Mus. Nat. Hist., vol. 20, p. 467, 1904 (Santa Marta district: Bonda, Minca, Cacagualito).

Cebus malitiosus Elliot, Bull. Amer. Mus. Nat. Hist., vol. 26, p. 230, 1909; A review of the Primates, vol. 2, p. 98, 1913.

C[*ebus*] c[*apucinus*] *cuscinus*, Pusch, Zeitschr. für Säuget., vol. 16, p. 196, 1941 (part; *malitiosus* a synonym).

Holotype.—Adult male, skin and skull, A.M.N.H. No. 14620; collected by Herbert H. Smith.

Type locality.—Bonda, northwest corner of base of Sierra Nevada de Santa Marta, Magdalena, Colombia.

Distribution.—Known only from the northwestern base and foothills of the Sierra Nevada de Santa Marta, but probably ranges throughout the lower levels of the western and northern slopes of the Sierra Nevada.

Characters.—Pale area of front less extensive, upperparts and limbs paler than in *hypoleucus*. Cap Prout's Brown, median dorsal region Cinnamon Brown, forearm and foreleg not markedly contrasting in color with back and sides of body; hairs of belly and chest Ochraceous-Tawny to Cinnamon-Brown and silvery; contrasting pale area of front extending well over upper surface of shoulder and inner side of upper arm.

Measurements.—Of a male and female topotype, respectively: Greatest length of skull, 95.0, 92.7; condylobasal length, 72.3, 71.7; zygomatic breadth, 62.3, 61.9; width of brain case, 54.2, 51.6; length of brain case, 77.4, 72.1; orbital breadth, 53.2, 53.3; greatest width across maxillary tooth rows, 30.4, 30.9; length, upper canine to M^3, 27.8, 26.9; length, lower canine to M_3, 31.1, 29.0; mandibular depth at condyle, 27.8, 28.1 mm.

Remarks.—Of available material, this race most nearly approaches the characters ascribed to *hypoleucus*. Inclusion of the upper surface of shoulders in the whitish frontal area is more marked in *malitiosus* than in any other race, with the possible exception of *hypoleucus*.

Pusch synonymized *malitiosus* with the Peruvian *cuscinus* on the basis of a female from Santa Marta with a brown frontal tuft.

Specimens examined.—Eight. Bonda, 6 (C.N.H.M., 3; C.M., 3); Trojas de Cataca, Santa Marta, 2 (C.M.).

CEBUS ALBIFRONS CESARAE, new subspecies

Holotype.—Old adult male, U.S.N.M. No. 281588; collected August 24, 1942, by Philip Hershkovitz, original number 525.

Type locality.—Río Guaimaral, a channel of the Río Cesar, Magdalena Department, Colombia; altitude 140 meters.

Distribution.—Río Cesar Valley west into the southern and eastern slopes of the Sierra Nevada de Santa Marta to approximately 500 meters above sea level, eastern Magdalena Department, Colombia.

Characters.—Palest of the Colombian-Venezuelan races. Cap Cinnamon or Snuff Brown; median dorsal region, forearm and foreleg with orangeous and contrasted with sides of back and trunk; hairs of belly and chest Ochraceous-Orange to pale Ochraceous-Buff and silvery; contrasting pale area of front extending over variable amounts of upper surface of shoulder and inner side of upper arm.

Coloration of holotype.—Hairs of sides of face, superciliary band, chin, throat, sides of neck, and auricular region, Cartridge Buff. Cap

Snuff Brown; median dorsal band Sayal Brown with a slight ochraceous mixture, sides of back uniformly Sayal Brown, lateral fringe paler, basal portions of hairs Hair Brown mid-dorsally, becoming paler, to silvery, laterally; chest and belly mixed Ochraceous-Buff and Warm Buff, the hairs paler basally; front of shoulder Warm Buff, hairs on front of upper arm broadly Ochraceous-Orange subterminally, buffy basally and terminally, outer surface Cinnamon and silvery becoming darker, to Sayal Brown, on posterior border; hairs of lateral surface of forearm Pinkish Cinnamon subterminally with silvery apices creating a hoar-frosted effect, fore and hind surfaces more uniformly ochraceous; upper surface of hand mixed Cinnamon and Light Buff, fingers with light buffy hairs. Hairs of lateral surface of thighs Pinkish Buff subterminally, silvery apically, more uniformly orangeous in front, the hairs behind Cinnamon apically, silvery basally. Upper surface of tail hoar-frosted Cinnamon Brown, underside Pinkish Cinnamon proximally, gradually becoming Ochraceous-Buff to yellowish terminally.

Coloration of the paratypes (16 males and 11 females from Guaimaral, 10 males and 3 females from El Orinoco, 5 km. east of the Río Cesar).—Dark phase: Cap Snuff Brown to Bister, or Cinnamon-Brown to Prout's Brown; median dorsal line usually a tone paler than cap, ranging from Prout's Brown to Ochraceous-Tawny, or Bister to Sayal Brown; sides of back and lateral fringe paler, Snuff Brown or Cinnamon-Brown, the color extending over lower half of outer side of upper arm to elbow; upper half of upper arm in front grading from whitish or yellowish of shoulder through Ochraceous-Orange or Tawny into the Cinnamon-Brown of forearm; hairs of forearm often silvery to buffy apically; hand above like forearm or darker, frequently mixed or edged with whitish hairs. Belly sparsely covered with silvery to Ochraceous-Orange hairs. Inner surface of thigh like belly, front and lateral surfaces like side of back and grading into Ochraceous-Orange to Tawny of foreleg. Other parts as described for the species. Pale phase: Cap Avellaneous to Buffy Brown, or Cinnamon to Sayal Brown. Median dorsal line Ochraceous-Buff to Ochraceous-Tawny, or Cinnamon-Buff to Sayal Brown; side of back paler, Light Ochraceous-Buff or Cinnamon-Buff to Cinnamon, lateral fringe like side of back or with a wash of orangeous; belly silvery to Ochraceous-Buff. The above colors are distributed over remaining parts in same manner as in dark phase individuals.

Division between dark and light color phases is made arbitrarily to facilitate description of the race. Variation in color ranges gradually from one extreme to the other. In general, young adults are paler than older ones. A female and nine males taken between April 2 and 5, during the long dry season, are in old pelage and markedly paler

than others taken from August 20 to October 27, during the short dry season or *veranillo* (Aug.–Sept.) and the heavy rainy season.

One immature, possibly 6 to 10 weeks old, with all milk incisors fully erupted, taken August 30, is Ochraceous-Orange middorsally, side of body Ochraceous-Buff, fore and hind limbs on outer sides mixed Ochraceous-Orange and Ochraceous-Buff; poorly defined cap Drab; proximal half of tail both above and below, Ochraceous-Orange, terminally paler grading into Warm Buff at tip; underparts, including chin and throat, practically bare.

An immature, possibly 12 to 14 weeks old, with canines half cut, first premolars emerging, taken August 23, is darker than preceding and nearly like adults of "pale phase"; development of pelage of underparts about one-half that of adults.

Measurements.—Those of the holotype are followed by the means and extremes of 18 adult males, including holotype of the type series, and by the means and extremes of 10 adult females of the type series: Head and body, 380, 384 (348–407); 368 (353–385); tail, 459, 454 (419–495); 478 (461–500); hind foot, 126, 127 (119–136); 125 (114–145); ear, 40, 37 (35–40); 36 (34–37); greatest length of skull, 97.4, 92.8 (89.2–97.4); 88.6 (86.4–91.2); condylobasal length, 72.0, 70.1 (66.0–73.3); 65.9 (63.7–67.4); zygomatic breadth, 65.7, 61.8 (58.3–67.1); 56.7 (53.4–58.4); width of brain case, 50.5, 50.8 (49.2–53.6); 49.3 (48.0–51.0); length of brain case, 78.6, 74.9 (70.9–78.6); 71.5 (70.2–73.6); orbital breadth, 55.2, 51.8 (47.5–55.6); 48.3 (46.4–51.7); greatest width across maxillary tooth rows, 29.1, 28.1 (26.3–29.6); 26.9 (25.9–27.8); length, upper canine to M^3, 27.2, 26.3 (24.6–28.3); 25.2 (24.7–25.7); length, lower canine to M_3, 29.8, 29.0 (27.3–30.4); 27.3 (26.1–28.2) mandibular depth at condyle, 30.8, 27.3 (23.3–30.8); 24.9 (23.3–26.6 mm.).

Villanueva (1 adult, 2 immature males, 1 adult female): *Adult male:* Cap Snuff Brown, median dorsal band mixed Tawny and Orange-Cinnamon, side of back and lateral fringe Cinnamon; forearm and hind leg nearly uniformly Tawny; hairs of upper proximal portion of tail Tawny tipped with buffy, terminally Cinnamon-Brown more broadly tipped with Warm Buff, gradually becoming paler toward tip, undersurface Tawny proximally, becoming buffy terminally. *Adult female:* Paler throughout than the male, without the hoar-frosted appearance of tail. *Immatures:* Both extremely pallid, the paler of the two with cap Warm Buff, median dorsal band Ochraceous-Buff, sides of body and upper arm Cream Buff, forearm from Ochraceous-Buff to Ochraceous-Tawny at wrist; thigh Ochraceous-Buff to Ochraceous-Orange, foreleg Ochraceous-Tawny; tail above Ochraceous-Buff proximally, becoming Warm Buff terminally, underside Warm Buff proximally to nearly pure white terminally; other immature more cinnamon, tail above, and forearm hoar-frosted.

One specimen was taken January 22, the others on February 23, during the dry season. They are in old pelage, extremely pale, and agree with the pale series taken later (April 2 to 5) in the Cesar-Guaimaral region toward the end of the same dry season.

Deforestation in the upper Río Cesar Valley has reached a point where these monkeys may be completely isolated now from their relatives lower down the valley and in the mountain forests. Because of deforestation, the region is becoming arid and some mammals here tend to average paler than those of the Cesar-Guaimaral region. Nevertheless, the micos have differentiated hardly at all. A comparison of these monkeys with those taken only during the rainy season in the Cesar-Guaimaral region would lead, however, to very different conclusions regarding the extent of differentiation.

Measurements.—One adult male and one adult female, respectively: Head and body, 356, 341; tail, 450, 415; hind foot, 121, 117; ear, 37, 35; greatest length of skull, 92.7, 85.0; condylobasal length, 71.6, 61.6; zygomatic breadth, 63.9, 54.8; width of brain case, 48.0, 48.6; length of brain case, 75.4, 68.4; orbital breadth, 56.1, 49.9; greatest width across maxillary tooth rows, 27.6, 26.9; length, upper canine to M^3, 26.0, 24.1; length, lower canine to M_3, 28.2, 27.1; mandibular depth at condyle, 27.8, 24.1 mm.

El Salado (3 males, 4 females): Tawnier on dorsum and limbs than the Río Cesar series. Four specimens taken July 17, in prime pelage, tawnier than the warmest-colored individual of the "dark phase" group of the Cesar. Remaining three specimens, one taken June 10, others June 15, in old pelage, paler but still average warmer on dorsum and limbs than average "dark phase" individuals of the Cesar.

The specimens were taken on the eastern slope, near the base, of the Sierra Nevada de Santa Marta, altitude about 300 meters. Their slight though consistent difference in color from the typical series may be seasonal as well as a peculiarity of the population they represent. They approach *malitiosus* in color but geographically are nearest *cesarae*. There are no barriers between the micos of the Cesar and those of the southern and eastern slopes of the Sierra Nevada. Large portions of the originally unbroken forest are still extant between the two zones.

Measurements.—Those of two adult males followed by those of two adult females: Head and body, 423, 398; 382, 364; tail, 436, 401; 458, 461; hind foot, 122, 125; 123, 128; ear 38, 40; 40, 40; greatest length of skull, 93.9, 91.2; 91.0, 89.9; condylobasal length, 69.2, 69.1; 68.7, 66.1; zygomatic breadth, 62.9, 62.9; 59.8, 56.6; width of brain case, 50.5, 50.4; 51.7, 48.7; length of brain case, 76.1, 72.7; 75.2, 71.4; orbital breadth, 50.1, 49.8; 52.5, 48.1; greatest width across maxillary tooth rows, 29.4, 27.7; 27.6, 26.5; length, upper canine to M^3, 27.3,

—; 24.6, 25.4; length, lower canine to M_3, 30.5, 29.2; 27.2, 26.7; mandibular depth at condyle, 27.3, 26.7; 27.9, 27.4 mm.

Colonia Agrícola de Caracolicito (4 males, 3 females): Median dorsal region, forearm and foreleg Ochraceous-Tawny to Cinnamon-Brown mixed with Tawny; belly silvery to Ochraceous-Orange. Paler specimens agree with dry season "pale phase" individuals of topotypical *cesarae*, the darker specimens grade into *malitiosus*. All individuals retain to a greater or lesser degree the orangeous tinge of forearm and foreleg characteristic of *cesarae*. Hairs of upper surface of tail in one female with apical banding resembling in an ill defined manner the hoar-frosted appearance of tail in males.

Measurements.—Those of two adult males followed by those of two adult females: Head and body, 405, 436; 418, 403; tail 468, 441; 463, 450; hind foot, 123, 123; 119, 124; ear, 37, 42; 37, 40; greatest length of skull, 94.6, 96.4; 91.6, 93.3; condylobasal length, 71.7, 75.3; 67.6, 68.9; zygomatic breadth, 63.2, 65.3; 59.5, 59.5; width of brain case, 51.2, 53.5; 50.3, 50.9; length of brain case, 76.9, 75.9; 73.0, 73.6; orbital breadth, 53.0, 53.4; 51.0, 52.2; greatest width across maxillary tooth rows, 28.8, 30.7; 28.4, 28.2; length; upper canine to M^3, 26.9, 26.8; 25.3, 24.6; length, lower canine to M_3, 30.0, 30.6; 27.2, 27.7; mandibular depth at condyle, 27.4, 30.1; 26.1, 25.6 mm.

Remarks.—Micos of the Cesar Valley proper differ notably from all others. The specimens taken there represent individuals of various clans and, with the exception of the Villanueva monkeys, interbreeding between these groups could easily be effected. On the other hand, each of the series from the eastern and southern slopes of the Sierra Nevada de Santa Marta are members of clans which now may have little if any association with those of the Cesar. Their characters show gradation into *malitiosus* of the western slope of the Sierra Nevada.

Specimens examined.—Sixty. El Orinoco and Río Guaimaral, Río Cesar, 42 (U.S.N.M.); Villanueva, 4 (U.S.N.M.); El Salado 7 (U.S. N.M.); Colonia Agrícola de Caracolicito, 7 (U.S.N.M.).

CEBUS ALBIFRONS PLEEI, new subspecies

Cebus chrysopus, auctorum (*nec* Lesson and *sajou à pieds dorés* Cuvier).
Cebus albifrons, Elliot, A review of the Primates, vol. 2, p. 88, 1913 (part; Colombia).

Holotype.—Adult male, skin and skull, U.S.N.M. No. 281624; collected May 29, 1943, by Philip Hershkovitz; original number 2029.

Type locality.—Swamplands of western bank of Río Magdalena near village of Norosí at base of northern extremity of Cordillera Central, Mompós, department of Bolívar, Colombia; altitude approximately 50 meters.

Distribution.—Between the Ríos Cauca and Magdalena, department of Bolívar, Colombia.

Characters.—Warmest colored of the races. Cap Prout's Brown; median dorsal region, forearm, and foreleg with reddish contrasting with brownish of sides of body; hairs of chest and belly Mars Orange to Hazel and silvery; contrasting pale area of front reduced or obsolete on shoulder.

Coloration of holotype.—Sides of face and neck, auricular region and chin, Cartridge Buff; Cap Prout's Brown; median dorsal band Sanford's Brown behind nape and on rump, less orangeous in middle portion; side of back Cinnamon-Rufous, lateral fringe Cinnamon-Brown lightly washed with orangeous. Chest and belly Orange-Rufous to Mars Orange, the hairs silvery basally; throat, front of shoulder buffy becoming orangeous distally to grade into Mars Orange of front of upper arm; outer side of upper arm Cinnamon-Brown grading into Burnt Sienna of forearm; dorsal surface of hand darker, fingers with reddish hairs. Thighs Sanford's Brown in front and behind, rufous laterally; foreleg uniformly Burnt Sienna, upper surface of foot and hairs of toes, Auburn. Upper surface of tail Burnt Sienna proximally, becoming Hazel distally, the hairs tipped with Cinnamon-Buff, tail terminally nearly uniformly Cinnamon-Buff; under surface of tail Cinnamon-Rufous proximally, becoming Cinnamon-Buff terminally.

Coloration of paratopotypes (2 adult males, 1 subadult male, 1 female).—Males like holotype but with greater amount of Cinnamon-Brown on forearm and foreleg. One male with Cinnamon-Brown of upper arm extending distally over lateral surface of lower arm; front and rear surfaces of forearm Burnt Sienna; upper surface of hand and hairs of fingers Auburn. Other adult male intermediate in distribution of orange and brown on fore and hind limbs, with hand and foot darker, belly more brown. Tails of both males darker than in holotype. Female, an immature with first four molariform teeth deciduous, Burnt Sienna on lower back, forearm and foreleg, becoming darker, to Auburn, on wrist, ankle, upper surface of hand and foot; hairs of belly Ochraceous-Tawny; foreback, cap, and tail paler than in the males.

The female and one male were taken May 29, the other male on June 24. These dates are in the rainy season, which was unusually heavy in 1943. Pelage of all specimens, including holotype, appears to be new.

Río San Pedro, above Norosí (1 adult male): An extremely dark reddish brown individual in prime pelage that may represent a dark phase. Cap blackish brown; median dorsal region between Burnt Sienna and Chestnut, side of back Auburn; side, lateral fringe and outer side of upper arm Prout's Brown; hairs of chest and belly Orange-Rufous to

Mars Orange; shoulder patch obsolete; front side of arm Burnt Sienna, lateral and rear surfaces of forearm Chestnut, upper surface of hand darker. Lateral surface of thigh Prout's Brown grading into Burnt Sienna of rear; foreleg Burnt Sienna becoming Chestnut on ankle and top of foot. Upper proximal surface of tail Prout's Brown, the hairs tipped with Orange-Rufous, underside Mars Orange, the whole becoming paler distally for nearly two-thirds of length where tail is bobbed.

The above specimen was taken in the Cordillera Central southwest of Norosí, altitude about 125 meters. At the time of collecting in this locality (June 1943) during a very rainy period, monkeys were scarce. However, they were said to be numerous during the dry season. At the same time, *pleei* was abundant in the flooded lowlands between Norosí and the Río Magdalena.

Measurements.—Those of the holotype are followed by those of an adult male paratype, and an adult male from Río San Pedro: Head and body, 397, 392, 422; tail, 495, 478, —; hind foot, 135, 134, 126; ear, 38, 34, 35; greatest length of skull, 95.0, 91.7, 94.1; condylobasal length, 73.6, 71.7, 74.8; zygomatic breadth, 60.6, 60.5, 63.5; width of brain case, 47.7, 48.2, 49.3; length of brain case, 74.3, 74.1, 76.3; orbital breadth, 49.4, 49.4, 54.0; greatest width across maxillary tooth row, 28.7, 27.0, 27.9; length, upper canine to M^3, 26.8, 24.2, 25.9; length, lower canine to M_3, 30.3, 27.6, 29.6; mandibular depth at condyle, 28.9, 25.3, 29.4 mm.

Remarks.—The geographically nearest race is *hypoleucus* of the Río Sinú region. Where the ranges of *hypoleucus* and *pleei* meet cannot be ascertained. Differences between the two forms are great, and it must be assumed that the Río Cauca (and the San Jorge) acts as a very nearly complete barrier to intergradation between them. Differences between *pleei* and the considerably paler *cesarae* are of a comparable magnitude. Here separation between the two forms is effected by the Río Magdalena.

Unavailability of the name *chrysopus* for micos of the lower Cauca-Magdalena Valley has already been discussed (p. 342). The pale "*Chrysope*" originally figured and described by Cuvier bears no close resemblance to the extremely warmly colored *pleei*.

As noted elsewhere (p. 342), the first specimens of *pleei*, erroneously identified as *chrysopus* by authors, were collected by Plée. One of his micos in the Muséum d'Histoire Naturelle des Pays-Bas, acquired from the Paris Museum, was recorded by Schlegel (1876, p. 196) as *Cebus albifrons*. The label of the specimen bore the name "carita blanca." Very little is known of the collector for whom the present monkey is named. He was one of three young students selected by the faculty of the Muséum National d'Histoire Naturelle, Paris, and

sent abroad in 1820 for the purpose of exploring the natural history of little-known regions. The first of the student travelers, Godefroy, was killed in an insurrection by natives shortly after his arrival at Manila. The second, Havet, died in Madagascar following hardships he endured in pursuing his work. The third, Plée, arrived safely at the island of St. Thomas in the Antilles. He then proceeded to Martinique and was supposed to have continued into Colombia, Venezuela, and the United States. The time spent by Plée in his travels is not exactly known. He made three shipments of his collections to the Paris Museum, but the specimens sent were accompanied by little or no data. The last shipment was made from the Antilles in 1826, after Plée's death. Presumably, Plée kept a personal account of his itinerary, his observations, and the specimens he preserved. Unfortunately, he, like the others, met with an untimely death in the midst of his work, and all the valuable information he might have accumulated was lost with him. There has been little confusion, however, in determining the Colombian locality of certain mammals collected by Plée. Comparison of Plée specimens with Colombian mammals have fairly well established that they must have originated at various points along the banks of the Río Magdalena in the departments of Magdalena and Bolívar.

Specimens examined.—Five. Norosí, 4 (U.S.N.M.); Río San Pedro, 1 (U.S.N.M.).

CEBUS ALBIFRONS VERSICOLOR Pucheran

(*Cf.* p. 343 for nomenclatorial discussion)

Cebus versicolor Pucheran, Rev. Zool., Paris, vol. 8, p. 335, 1845.—Cabrera, Rev. Real. Acad. Cienc. Madrid, vol. 16, ser. 2, p. 230, 1917.

Cebus albifrons, Schlegel, Mus. Hist. Nat. Pays-Bas, p. 195, 1876 (part; specimen No. 3, p. 197, "près de Medellin").—Elliot, A review of the Primates, vol. 2, p. 88, 1913, (part).

Cebus c[apucinus] versicolor, Pusch, Zeitschr. für Säuget., vol. 16, p. 193, 1941, part (Colombia).

Holotype.—Mounted specimen, skull in skin, Muséum National d'Histoire Naturelle, Paris, Type Catalogue No. 86, Accession Catalogue No. 559 (479); received from M. Jurgens in 1844.

Type locality.—Originally given as "Santa-Fe de Bogota," Colombia. No monkeys occur in the immediate vicinity of the city of Bogotá (see Remarks, below).

Distribution.—The middle Río Magdalena region exclusive of the western slope of the Cordillera Oriental, from the departments of Cundinamarca and Tolima north as far as the southern portion of the department of Magdalena (Gamarra), Colombia.

Characters.—Paler than *pleei*, less red on dorsal surface; darker than *cesarae*, more red on limbs. Cap Snuff Brown to Prout's Brown; median dorsal region Snuff Brown becoming Tawny posteriorly;

forearm and foreleg Orange-Rufous to Chestnut sharply contrasting with anterior half of back and side of body; hairs of belly and lower part of chest Orange-Rufous to Burnt Sienna and silvery, of upper part of chest, silvery and buffy; pale area of front extending slightly or not at all over upper surface of shoulder.

Río Chili, Tolima, tributary of upper Cucuana, altitude between 500 and 700 meters (1 male, 1 female): *Adult male:* Cap Prout's Brown, nape paler, upper median dorsal region Snuff Brown, posteriorly becoming Ochraceous-Tawny to Tawny on rump and basal portion of upper surface of tail; side of back Snuff Brown becoming Sayal Brown on side and lateral fringe; hairs of belly Orange-Rufous terminally, silvery basally, of chest silvery; front of shoulder whitish, the hairs tipped with pinkish. Outer side of upper arm Snuff Brown, forearm and front of upper arm Burnt Sienna; wrist Chestnut, upper surface of hand and hairs of fingers Bay. Thigh Sanford's Brown laterally, Burnt Sienna in front; foreleg Burnt Sienna becoming darker distally, to Chestnut on ankle and upper surface of foot, hairs of toes Bay. Tail grading to Warm Buff terminally both above and below. *Adult female:* Size small but with complete permanent dentition; extremely pale due to worn condition of pelage, the pale basal portions of hairs exposed and dominating in superficial coloration of back. Cap Snuff Brown; upper median dorsal region, sides of back and lateral fringe Wood Brown, lower half of median dorsal region and base of tail above, Ochraceous-Tawny; whitish patch extending from front to upper surface of shoulder; outer side of forearm Sanford's Brown, of foreleg Orange-Rufous. Tail, except at base, Ochraceous-Buff below, browner above.

Gamarra, Río Magdalena, altitude 69 meters (1 male, 3 females): Cap Cinnamon-Brown to Prout's Brown; median dorsal region anteriorly Snuff Brown to Sayal Brown with a light wash of Tawny, posteriorly more Tawny; side of back paler, with less Tawny, becoming Sayal Brown on sides of body and lateral fringe; hairs of belly Orange-Rufous to Burnt Sienna, becoming buffy to whitish on chest. Brown of side extending over upper surface of shoulder and outer side of upper arm; forearm and front of upper arm Sanford's Brown to Burnt Sienna; upper surface of hand, in one female Ochraceous-Buff with an orangeous patch, hairs of fingers Ochraceous-Buff, in remaining specimens, hands and fingers more orange. Thigh Orange-Rufous to Sanford's Brown on lateral surface, upper surface of foot darker, fringed with buffy hairs; toes with a mixture of buffy and Bay hairs. Tail in females Snuff Brown above, Cinnamon beneath becoming buffy terminally, in male the hairs Prout's Brown with light tips above, beneath Tawny proximally, the whole becoming paler distally.

The series differs from both *pleei* and the type and Tolima specimens

of *versicolor* by paler hands and wrists. Identity with typical *versicolor* is shown, however, by coloration of ventral surface, sharp contrast between median dorsal region and reddish limbs, and by the pale tail.

Measurements.—The cranial measurements of an adult male and female from Río Chili are followed by those of two young adult females from Gamarra: Greatest length of skull, 96.8, 85.5; 88.3, 85.8; condylobasal length, 71.6, 64.0; 66.9, 61.7; zygomatic breadth, 64.4, 53.6; 57.4, 54.8; width of brain case, 53.1, 46.3; 48.8, 47.8; length of brain case, 74.5, 70.0; 70.3, 70.3; orbital breadth, 51.1, 46.6; 49.4, 45.7; greatest width across maxillary tooth rows, 30.0, 26.1; 28.9, 26.4; length, upper canine to M^3, 28.1, 24.2; 25.8, 24.6; length, lower canine to M_3, 30.5, 26.3; 27.9, 26.9; mandibular depth at condyle, 25.0, 25.5; 25.4, 22.7 mm.

Remarks.—Santa Fé de Bogotá, where *versicolor* was said to have originated, is also the ancient name of a large area comprising the present department of Cundinamarca and parts of neighboring departments, including the upper Río Meta region. The above described male from Río Chilí, Tolima, agrees best with the type. Nevertheless, it would be premature to regard it as certainly typical. The nature of material here assigned to *versicolor* indicates, nevertheless, that the type specimen did originate somewhere in the middle Río Magdalena Valley exclusive of the western slope of the Cordillera Oriental north of Bogotá.

Nape and upper surface of hands and feet of type are dark brown, not black as originally described.

Specimens examined.—Seven. Holotype (M.N.H.N.); Río Chilí, 2 (U.S.N.M.); Gamarra, 4 (C.M.).

CEBUS ALBIFRONS LEUCOCEPHALUS Gray

(*Cf.* p. 344 for nomenclatorial discussion)

Cebus leucocephalus Gray, Proc. Zool. Soc. London, 1865, p. 827, fig. 4, 1865.—Cabrera, Rev. Real. Acad. Cienc., Madrid, vol. 16, ser. 2, p. 230, 1917 (synonym of *versicolor*).

Cebus hypoleucus, Martínez, Soc. Esp. Hist. Nat. Madrid, vol. 2, p. 242, 1873 ("Bogotá").

Cebus apella leucocephalus, Osgood, Publ. Field Mus. Nat. Hist., zool. ser., vol. 10, p. 32, 1910 (Orope, Venezuela).

Cebus albifrons, Elliot, A review of the Primates, vol. 2, pp. 88, 89, 1913 (part; *leucocephalus*, synonym).

C[*ebus*] c[*apucinus*] *versicolor*, Pusch (not Pucheran), Zeitschr. für Säuget., vol. 16, p. 193, 1941.

Holotype.—In British Museum (Natural History); purchased from Parzudaki.

Type locality.—"Colombia." Here restricted to El Tambor, Río Lebrija, 25 km. northwest of Bucaramanga, Santander, Colombia.

Distribution.—Western slope of Cordillera Oriental, department of Santander, east through low passes to the Río Zulia-Río Catatumbo drainage basin, department of Norte de Santander, Colombia, and state of Zulia, Venezuela.

Character.—Darkest race of *albifrons*. Cap Cinnamon-Brown to Bister; median dorsal region Cinnamon-Brown mixed with Tawny, forearm and foreleg Sanford's Brown to Russet or Bay, moderately contrasted with back and sides; hairs of belly and chest from nearly uniformly buffy to nearly uniformly Mars Orange; pale area of front not extending over upper surface of shoulder, reduced or obsolete on front of shoulder.

Coloration of adult male topotype.—Cap Bister, nape Prout's Brown; median dorsal region Cinnamon-Brown with a slight Tawny tinge anteriorly, becoming Russet posteriorly, sides paler becoming Snuff Brown on lateral fringe. Buffy shoulder patch nearly obsolete in front; upper side of shoulder and lateral surface of upper arm Cinnamon-Brown; outer side of upper arm and inner side of forearm Sanford's Brown; outer side of forearm approximately Burnt Sienna, posterior side darker grading into Auburn of wrist and upper surface of hand; hairs of fingers mixed Auburn and buffy. Lateral surface of thigh Cinnamon-Brown, front of thigh and foreleg Burnt Sienna becoming Auburn on ankle and top of foot; hairs of toes blackish. Hairs of belly and lower part of chest Burnt Sienna becoming Orange-Rufous on upper part of chest and inner side of upper arm. Tail above Cinnamon-Brown proximally, becoming slightly paler terminally, underside Cinnamon-Brown but hairs with longer buffy basal portions than above, terminally the hairs becoming increasingly buffy.

An immature male topotype with milk premolars and uncut third molar is approximately a tone paler throughout than the adult male.

Measurements.—Of the adult male topotype: Head and body, 407; tail, 499; hind foot, 132; greatest length of skull, 99.1; condylobasal length, 76.7; zygomatic breadth, 63.1; width of brain case, 51.6; length of brain case, 78.0; orbital breadth, 51.0; greatest width across maxillary tooth rows, 29.5; length, upper canine to M^3, 28.3; length, lower canine to M_3, 30.9; mandibular depth at condyle, 30.5 mm.

Bella Vista, Río Tarra, Norte de Santander, altitude 500 meters (1 adult male): Cap Prout's Brown with a mixture of black-tipped hairs; streaks of long, brownish-tipped hairs on front and side of face; hairs of median dorsal region Cinnamon-Brown to Prout's Brown subterminally, Ochraceous-Tawny terminally, the whole appearing as a fine mixture of both colors, the darker dominating anteriorly, the paler posteriorly; side of body and lateral fringe Prout's Brown. Upper surface of shoulder and lateral surface of upper arm Sanford's Brown grading into nearly Auburn of forearm and upper surface of hand;

hairs of fingers blackish. Lateral surface of thigh like rump becoming uniformly Sanford's Brown on inner, fore and hind sides; foreleg Burnt Sienna, ankle and top of foot darker, hairs of toes blackish. Hairs of belly, chest and front of shoulder Mars Orange with silvery bases. Proximal portion of tail above like back, terminally assuming a hoar-frosted appearance; tail beneath Cinnamon-Brown proximally to Pinkish Cinnamon terminally.

The specimen is in new pelage, its coloration unusual. The fine ticking on the median dorsal region recalls the condition characteristic of *Cebus nigrivittatus*. In this species, however, the ticking is much coarser, the hairs longer and laxer, the annulations more sharply contrasted in color. The above described brown streaks on side of face extend from the brown eye brows across jowls. In *Cebus apella*, the characteristic dark line is immediately in front of ears and extends from crown to beneath chin.

Measurements.—Head and body, 370; tail, 392; hind foot, 119; ear, 36; greatest length of skull, 92.5; condylobasal length, 69.9; zygomatic breadth, 62.2; width of brain case, 47.7; length of brain case, 74.1; orbital breadth, 50.2; greatest width across maxillary tooth rows, 28.9; length, upper canine to M^3, 27.3; length, lower canine to M_3, 30.3; mandibular depth at condyle, 26.3 mm.

Orope, Zulia (2 males, 5 females, all young adults): Cap Prout's Brown to Bister; median dorsal region Cinnamon-Brown to Prout's Brown with or without a Tawny overlay; sides paler, lateral fringe Cinnamon-Brown to Snuff Brown; outer side of upper arm like side of back; front of upper arm and lateral surface of forearm Sanford's Brown to Auburn, wrist and upper surface of hand Bay; hairs of fingers mixed buffy and Bay to blackish. Outer side of thigh like rump, front more red; foreleg and foot like forearm and hand. Hairs of belly Burnt Sienna or Ochraceous-Orange, chest Burnt Sienna or Ochraceous-Buff to Ochraceous-Orange, the buff continuing onto front of shoulder. Upper surface of tail Bister to Prout's Brown proximally, terminally becoming only slightly paler, in one specimen, to buffy, in another; undersurface Tawny to buffy terminally. The skins are in a bad state of preservation; pelage old and worn with a faded appearance on sides of lateral fringe due to prominent exposure of the pale basal portions of the hairs. The specimens were taken March 2, 1908, during the dry season.

Measurements.—Those of a young adult male and female, the largest individuals of the series: Head and body, 395, 330; tail, 405, 440; hind foot, 115, 115; ear, 35, 30; greatest length of skull, 89.5, 86.9; condylobasal length, 67.6, 62.6; zygomatic breadth, 56.9, 57.2; width of brain case, 49.3, 48.9; length of brain case, 71.1, 71.4; orbital breadth, 49.1, 48.2; greatest width across maxillary tooth rows, 27.1,

25.8; length, upper canine to M^3, 26.1, 25.1; length, lower canine to M_3, 23.7, 24.4; mandibular depth at condyle, 27.1, 25.8 mm.

Remarks.—Distinction of *leucocephalus* from *versicolor* was originally premised on the presence of a midfrontal line in the former and its absence in the latter. The nature of this character, shown repeatedly to be individually variable, together with the Colombian habitat of both *leucocephalus* and *versicolor*, induced most authors to regard the two as identical. Each form, however, occupies a distinct geographical area, and *leucocephalus* is much the darker monkey.

The detailed description of the "Bogotá" monkey recorded as *hypoleucus* by Martínez (*op. cit.*) agrees with *leucocephalus*. The true habitat of this individual was probably somewhere in the Andean forests north of Bogotá and is, no doubt, the same specimen assigned to *leucocephalus* by Cabrera (*op. cit.*). The Orope, Venezuela, series includes specimen No. 16567 (C.N.H.M.) that Osgood (1910, p. 32) compared with the type of *leucocephalus*. The nearly complete agreement noted by Osgood between his specimen and the type, applies equally well to the individual described above from El Tambor, Colombia. Hence, restriction of type locality to this last place conforms both to the country originally stated to be the habitat as well as to that part of Osgood's suggestion that the "exact locality was at least in northeastern Colombia."

Fischer (1829, pp. 57, 545) listed *Pithecia leucocephala* Geoffroy as *Cebus leucocephalus*. The result of this action may be regarded by some as a "preoccupation" of *Cebus leucocephalus* Gray. Article 35 of the International Code, as here interpreted, relates primarily to names given to species and subspecies described as new and not to secondary combinations resulting from transfer of species and subspecies to genera other than those under which they were originally described. However, in the event that two identical specific names each originally assigned to a different genus are subsequently included in the same genus, the more recent specific name is rejected but not *suppressed*. Such "secondary homonyms" revert to their original status when generically removed from preoccupying specific names. Names substituted for such "secondary homonyms" then become absolute synonyms of them. The status of *Cebus nigrivittatus* Wagner (=*Cebus leporinus* Pusch, *cf. supra* p. 345) is a case in point. The name *Cebus leucocephalus* Gray cannot be construed as either a primary or a secondary homonym under any circumstance.

Specimens examined.—Eleven. Type of *leucocephalus* Gray (B.M.); El Tambor, Santander, Colombia, 2 (C.M.); Bella Vista, Río Tarra, Norte de Santander, Colombia, 1 (U.S.N.M.); Orope, Zulia, Venezuela, 7 (C.N.H.M.).

CEBUS ALBIFRONS ADUSTUS, new subspecies

[?] *Cebus apella leucocephalus*, Osgood, Publ. Field Mus. Nat. Hist., zool. ser., vol. 10, p. 66, 1912 (El Panorama, Río Aurare, Venezuela).—Cabrera, Rev. Real Acad. Cienc., Madrid, vol. 16, ser. 2, p. 230, 1917.

Holotype.—Adult male, skin and skull, C.N.H.M. No. 22194; collected February 22, 1920, by W. H. Osgood and H. B. Conover; original number 5141.

Type locality.—Near head of Río Cogollo (Apón) at eastern base of Sierra de Perijá, about 5 kilometers northwest of Machiques, Lake Maracaibo region, Zulia, Venezuela; altitude about 100 meters above sea level.

Distribution.—Known only from type locality; range probably extends across the northern half of the Sierra de Perijá in Venezuela and Colombia.

Characters.—Paler throughout than *leucocephalus;* limbs redder, more sharply contrasted with trunk than in *malitiosus.* Cap Cinnamon-Brown; median dorsal region Sayal Brown anteriorly, becoming Tawny posteriorly; forearm and foreleg Russet to Burnt Sienna strongly contrasted with back and Sayal Brown of sides; hairs of belly and lower part of chest Mars Orange to Burnt Sienna, of upper part of chest ochraceous with buffy bases; pale area of front extending to upper part of shoulder.

Coloration of holotype.—Cap Cinnamon-Brown, anterior portion of back Sayal Brown, posterior portion Tawny; sides, lateral fringe, and outer side of upper arm, Sayal Brown, forearm nearly uniformly Russet; hand above Russet edged with buffy, fingers with grayish hairs. Thigh and foreleg Burnt Sienna becoming nearly Chestnut on upper surface of foot, toes with mixed buffy and dark brown hairs. Hairs of belly and lower part of chest Mars Orange and Burnt Sienna, of upper part of chest and axillae, buffy with Ochraceous-Orange tips. Tail above hoar-frosted in appearance, the hairs Cinnamon-Brown tipped with buffy, beneath Mars Orange proximally becoming Ochraceous-Orange to buffy terminally.

One adult male paratopotype like holotype but slightly paler on back, chest, and tail; hind legs slightly redder.

Measurements.—Those of the holotype followed by those of a male and female topotype: Greatest length of skull, 94.7, 91.8, 87.9; condylobasal length, 70.5, 67.1, 63.3; zygomatic breadth, 67.0, 61.5, 57.0; width of brain case, 51.1, 50.3, 48.8; length of brain case, 75.0, 75.1, 71.7; orbital breadth, 52.9, 51.6, 46.3; greatest width across maxillary tooth rows, 28.6, 27.4, 26.6; length, upper canine to M^3, 26.3, 26.4, 24.7; length, lower canine to M_3, 29.5, 28.8, 27.3; mandibular depth at condyle, 30.4, 26.3, 24.0 mm.

Remarks.—C. a. adustus differs in a comparatively small degree from its nearest relative, *malitiosus* of the Sierra Nevada de Santa

Marta. Its fore and hind limbs are redder, especially on undersurface, cap paler and the pale frontal area considerably more restricted in extension. Intergrades may occur along the northern slope of the Sierra Nevada and the northwestern slope of the Sierra de Perijá. The writer roamed widely over the northern half of the Sierra de Perijá, mostly on the Colombian side, from November 1942 to March 1943, but failed to encounter a single *Cebus*. However, the existence of micos in the area concerned had been reported to him on a few occasions and evidence of their raids on maize fields was noted.

Monkeys recorded as *Cebus apella leucocephalus* by Osgood in 1912 were seen by that author near El Panorama, Río Aurare, Lake Maracaibo, opposite the town of Maracaibo, Venezuela. No specimens were preserved. Cabrera (1917, p. 230) hazarded the opinion that the monkeys were probably *C. nigrivittatus brunneus*. The Río Aurare is so near areas known to be inhabited by *albifrons* and *nigrivittatus* that either species, or both, might occur there. However, Osgood's earlier (1910) and accurate identification of the Orope series as *leucocephalus* is persuasive evidence for regarding micos of the more northern locality as representing the same species, though not necessarily the same race. They are referred, provisionally, to *adustus*.

Specimens examined.—Three. Río Cogollo, Zulia, Venezuela, 3 (C.N.H.M.).

CEBUS ALBIFRONS ALBIFRONS Humboldt

(*Cf.* p. 337, for nomenclatorial discussion)

Simia albifrons Humboldt, Recueil d'observations de zoologie et d'anatomie comparée, vol. 1, pp. 324–356, 1812 [1811].

Cebus albifrons, Elliot, A review of the Primates, vol. 2, p. 88, 1913 (part; references to *albifrons* Humboldt only).—Cabrera, Rev. Real. Acad. Cienc., Madrid, vol. 16, ser. 2, p. 228, 1917.—Cruz Lima, Mammals of Amazonia, Contrib. Mus. Paraense Emilio Goeldi Hist. Nat. Etnogr., p. 149, 1945 (no distributional records).

Type.—No specimens preserved; description most probably based on an individual observed in captivity in Maipures.

Type locality.—See Distribution.

Distribution.—Said to be the banks of the Orinoco in the region of the cataracts from Maipures to Apures (Venezuelan-Colombian boundary), and the neighborhood of the extinct mission of Santa Barbara near the mouth of the Río Ventuari.

Characters.—Known only from original description and comparisons.

"Le Matchi du Haut-Orénoque, que les Indiens Guarekens appellent *Ouavapavi*, a 0. 378 m. (14 pouces) de long du sommet de la tête à l'origine de la queue: il a la face gris-bleuâtre, a l'exception des orbites et du front qui sont d'un blanc pur. Le contraste de ces deux couleurs fait distinguer au premier abord *l'Ouavapavi*, que je désigne sous le nom de *Simia albifrons*, du Saï [*C. nigrivittatus*] et du Sajou ordinaire

[*C. apella*]. La tête est un ovale très-alongé. Le pelage du corps est grisâtre, plus clair vers la poitrine et le ventre, plus obscur vers les extrémités qui sont d'un brun-jaunâtre. Le sommet de la tête est d'un gris tirant sur le noir: une strie cendrée se prolonge longitudinalement de la calotte par le milieu du front vers le nez: les sourcils sont de même d'un gris très-obscur. Les yeux sont grands, bruns et très-vifs. Les oreilles ont un rebord et sont couvertes de poils. La queue est prenante, mais toute couverte de poils, et par conséquent sans callosité: elle est à peu près de la longueur du corps, cendrée par dessus, blanchâtre par dessous, et d'un brun-noir à l'extrémité. Les ongles sont tous arrondis et très-peu convexes. Une strie d'un gris foncé obscur descend le long du dos.

"*Simia albifrons, imberbis, cauda prehensili, ex albo cinerascens, vertice nigro, facie caerulea, fronte et orbitis niveis, cruribus et brachiis fuscescentibus.*

"Les Ouavapavis sont très-laids, mais extrêmement doux, agiles et moins criards que les Singes pleureurs [*C. nigrivittatus*]. Ils habitent, par troupeaux, les forêts qui avoisinent les cataractes de l'Orénoque et la mission de Santa Barbara. Nous en avons trouvé un individu à Maypures qui, tous les matins, saisissoit un cochon sur lequel il restoit monté la journée en parcourant la savane qui environne les cabanes des Indiens. Nous l'avons même vu souvent sur le dos d'un chat qui avoit été élevé avec le Singe dans la maison du missionnaire, et qui souffroit patiemment les effets le la pétulance de l'*Ouavapavi*."

Remarks.—The above description does not fit any available specimen from the upper Orinoco, the Casiquiare, and upper Rio Negro. No topotypical specimen of *albifrons* has ever been recorded and others which had been assigned to this race are not representative. The brownish-black tip to the otherwise pallid tail of Humboldt's monkey is the chief obstacle to identifying any subsequently recorded member of the *albifrons* group with the type. Only topotypes can establish whether or not the black-tipped tail is a purely individual variation, a racial characteristic, or an inaccurate notation. For the present, material from between the lower Amazon and the Casiquiare is assigned to *unicolor* Spix.

In spite of the inability to identify anything with the subspecies, there is abundant evidence to justify the identity of present material with the species *albifrons*. Three species of *Cebus* range in the upper Orinoco, the Casiquiare and upper Rio Negro regions. These are *apella, nigrivittatus,* and *albifrons*. Humboldt (1812, pp. 323–324) compared the three species with each other and emphasized salient diagnostic characters of each. He distinguished *Cebus apella* (with *fatuellus* a simple variety) as the "tufted" monkey with the dark band encircling the face. *C. nigrivittatus,* termed *Simia capucina* by

Humboldt, was regarded as very similar to *C. apella* but paler, body brown mixed with yellow, cap triangular-shaped, tufts and dark facial band absent. The description of *albifrons*, quoted above, is clearly that of a different species and, except for the black-tipped tail, applies to micos here assigned to this species.

Specimens examined.—None.

CEBUS ALBIFRONS UNICOLOR Spix

(*Cf.* p. 341 for nomenclatorial discussion)

Cebus unicolor Spix, Simiarum et vespertilionum Brasiliensium, p. 7, pl. 4, 1823.—Elliot, A review of the Primates, vol. 2, p. 91, 1913.—Cabrera, Rev. Real Acad. Cienc., Madrid, vol. 16, ser. 2, p. 231, 1917.—Cruz Lima, Mammals of Amazonia, Contrib. Mus. Paraense Emilio Goeldi Hist. Nat. Etnogr. (English ed.), p. 150, 1945 (no distributional records).

Cebus gracilis Spix, Simiarum et vespertilionum Brasiliensium, p. 8, pl. 5, 1823 (type locality, Teffé).

Cebus chrysopus Lesson, Manuel de mammalogie, p. 55, 1827 (name based on Cuvier's *sajou à pieds dorés*).

Cebus flavescens Gray, Proc. Zool. Soc. London, 1865, p. 827 (Brazil).

Cebus gracilis Cabrera, Rev. Real Acad. Cienc., Madrid, vol. 16, ser. 2, p. 229, 1917.—Cruz Lima, Mammals of Amazonia, Contrib. Mus. Paraense Emilio Goeldi Hist. Nat. Etnogr. (English ed.), p. 129, pl. 24, 1945 (no distributional records).

Cebus gracilis Spix (*vel C. albifrons* Humboldt ?), Lönnberg, Arkiv Zool., Stockholm, vol. 31A, no. 23, p. 17, 1939 (Rio Solimões; Codajáz; Rio Tapajóz; Irocanga and Patinga; Rio Purús: Jaburú; Rio Juruá: Igarapé de Gordão, João Pessõa, Lago Grande, Santo Antonio, Rio Eirú).

Cebus albifrons, Elliot, A review of the Primates, vol. 2, p. 88, 1913 (part; *gracilis* Spix, synonym).—Tate, Bull. Amer. Mus. Nat. Hist., vol. 76, p. 213, 1939 (Rio Negro and Río Casiquiare).

Cebus flavus, Elliot, A review of the Primates, vol. 2, p. 93, 1913 (part; references to Brazilian records).

C[ebus] c[apucinus] gracilis, Pusch, Zeitschr. für Säuget., vol. 16, p. 192, 1941 (part; Amazonian records east of the Andes only and "*C. gracilis* hellstirnig, Lönnberg 1939," not *capucinus* Tschudi and *aequatorialis* Allen).

C[ebus] c[apucinus] versicolor, Pusch, Zeitschr. für Säuget., vol. 16, p. 193, 1941 (part; Brazilian records and "*flavus* Geoffroy" only).

C[ebus] cuscinus cuscinus, Pusch, Zeitschr. für Säuget., vol. 16, p. 196, 1941 (part; "*C. gracilis dunkelstirnig*, Lönnberg," and Chicosa, Peru, only).

Cebus species B, Thomas, Ann. Mag. Nat. Hist., ser. 10, vol. 2, p. 252, 1928 (Cumeria; Chicosa; Cerro Azul; Contamana; Masisea, all localities in Río Ucayali drainage, Peru).

Holotype.—Adult male, skin and skull, Zoologische Staatssammlung, Munich; collected by the Spix and Martius Expedition to Brazil.

Type locality.—Forests of the Rio Teffé, near its junction with the Amazon, Amazonas, Brazil.

Distribution.—Limits unknown but may include all the middle and upper Amazonian region east of the Andes in Brazil, Venezuela (Río Casiquiare), southeastern Colombia, Peru, and Bolivia.

Characters.—Most uniformly brightly colored race of *albifrons*.

Cap Snuff Brown to Bister, frontal region buffy to ochraceous; back Ochraceous-Buff to Ochraceous-Orange or Tawny more or less lined with dark brown; sides with less brown, lateral fringe Ochraceous-Buff to Ochraceous-Orange; forearm and foreleg Ochraceous-Buff to Tawny contrasting with dark lining of back; hairs of belly Ochraceous-Buff to Ochraceous-Orange, of chest like belly or white; whitish patch obsolete on front of shoulder.

Measurements.—Those of an adult male and female from Solano, Río Casiquiare, followed by those of two adult females from Rio Negro Yavanari and Casas Pereira Igarapé): Head and body, 375, 375; 370, 365; tail, 425, 410; 420, 460; hind foot, 124, 113; 115, 115; greatest length of skull, 94.6, 91.8; 92.1, 91.6; condylobasal length, 71.0, 67.3; 68.4, 69.3; zygomatic breadth, 57.3, 58.6; 57.6, 57.8; width of brain case, 53.6, 51.2; 51.7, 51.0; length of brain case, 73.7, 74.5; 72.7, 70.7; orbital breadth, 49.7, 51.5; 50.3, 50.7; greatest width across maxillary tooth rows, 28.6, 28.5; 29.1, 27.8; length, upper canine to M^3, 27.3, 26.3; 26.3, 26.0; length, lower canine to M_3, 30.5, 29.2; 28.9, 27.9; mandibular depth at condyle, 25.2, 25.6; 24.8, 29.0 mm.

Remarks.—The above characterization is based on original descriptions and colored plates of *unicolor* and *gracilis*, and eight specimens recorded by Tate (*op. cit.*) as *C. albifrons*. The monkey figured by Spix as *gracilis* is a female. The type of *unicolor* is an old adult male. It was said to differ from *gracilis* by its larger head, generally larger proportions and by the short, stiff gray-banded hairs of limbs and tail. These are differences of age and sex. The described gray ticking is probably the hoar-frosted condition characteristic of many males. This character is not evident, however, in the colored plate. Wagner (1833, p. 991) in critically reviewing the Primates described by Spix, indicated that the two extant specimens of *gracilis* are merely immature representatives of *unicolor*. The types of both *unicolor* and *gracilis* are from Teffé. Available specimens, from four localities along the Rio Negro and the Casiquiare, show slight local differences. Specimens from Yavanari are darkest, especially on outer side of thigh. However, this may be a dark color phase as contrasted with the brightly colored individual from Casas Pereira. Remaining specimens, from the Casiquiare, are intermediate in coloration. The original colored figures of *unicolor* and *gracilis* though not identical with any present specimens, fit very well into the series as a whole.

There is as yet far too little material for a satisfactory determination of the kind of variation these brightly colored monkeys undergo within the vast territory assigned to the range of *unicolor*. Collectively, they are readily distinguished from all other races of *albifrons*. There is a superficial resemblance between *unicolor* and erythristic representatives of "tufted" cebids from eastern Brazil and sometimes

they have been confused with each other. The dark extremities and, usually, the dark facial band, the coronal tufts, especially in the male, always serve to distinguish the "tufted" form from *unicolor*. Cranial characters are, of course, outstandingly diagnostic.

Lönnberg (*op. cit.*) has given an excellent account of 19 specimens of *albifrons* he recorded from the middle Amazonian region. Judged by his descriptions, these micos show a somewhat wider range of variation in color than is given here for the subspecies. It is possible, however, that more than one race is involved in view of the wide distances and the great rivers separating some of the localities where his specimens were taken. Without recognizing it as a purely sexual characteristic, Lönnberg noted that in four females the whole of the frontal area was of approximately the same color as the cap. He attributed this to simple individual variation as other specimens, both male and female with pale colored foreheads were taken in the same localities. Pusch, however, assigned the "dunkelstirnig" females to his "*Cebus cuscinus cuscinus*." The "hellstirnig" specimens he retained as *gracilis*. He elected to list the earlier name *unicolor* as a synonym of *gracilis*.

Specimens from the Río Ucayali region recorded by Thomas (*op. cit.*) as species B, were described as a "paler species with red legs and a whitish tail." They were said to be conspecific with those Thomas described as *Cebus flavescens cuscinus*. This establishes the identity of these micos as *C. albifrons* nearest *unicolor*. It is also probable that the series agrees sufficiently with *chrysopus* to warrant its recognition as a valid race. Pusch examined the specimens in question and referred all but the Chicosa female to *gracilis*. That female was described by Thomas (*op. cit.*) as differing "from the rest by having a somewhat tufted head, with less white on the face." Pusch assigned it to his "species" *cuscinus*. In addition to the above series, Thomas recorded at the same time true "tufted" cebids from the same localities. These were identified by him as species A and described as "a dark species with black legs and black tails." They were said to agree closely with *Cebus fatuellus* [=*apella*] *peruanus* except for the reduction or obsolescence of their tufts. True, the coronal tufts of *C. apella* are not always prominent. Sometimes they consist of only a few hairs raised in form of lines. This condition together with the presence of tufts (of a different character and entirely restricted to females) in "untufted" species from the same localities, caused Thomas (*op. cit.*) to remark that "perhaps the tufts will prove to be an entirely illusory character." Representatives of dark limbed, "tufted" *C. apella* occur throughout most of the range of *C. albifrons unicolor*.

Specimens examined.—Thirteen. Marimonda, Río Orinoco, Venezuela, 1 (A.M.N.H.); Solano, Río Casiquiare, Venezuela, 3 (A.M.N.H.); Yavanari, Rio Negro, Brazil, 3 (A.M.N.H.); Casas

Pereira Igarapé, Rio Negro, Brazil, 1 (A.M.N.H.); Puerto Victoria, Río Pachitea, Huanuco, Peru, 2 (C.N.H.M.); Tingo María, Río Huallaga, Huanuco, 2 (C.N.H.M.); no locality, Peru, 1 (C.N.H.M).

CEBUS ALBIFRONS YURACUS, new subspecies

[?] *Cebus griseus*, Osculati (*nec* Desmarest), Esplorazione delle regioni equatoriali lungo il Napo . . ., Milan, p. 188, 1850 (Ríos Napo and Curaray).—Cornalia, *ibid.*, Vertebratorum synopsis, p. 302 (Río Napo).

C[*ebus*] *albifrons*, Cabrera, Anal. Soc. Española Hist. Nat., Madrid, ser. 2, vol. 29, p. 78, 1900 (La Coca, Río Napo; Río Aguarico; Destacamento, mouth of Río Napo); Trab. Mus. Nac. Cienc. Nat., Madrid, No. 11, p. 25, 1912 (Río Coca; Aguano, Río Napo; Destacamento).—Festa, Boll. Mus. Zool. Anat. Comp. Torino, vol. 18, No. 435, p. 6, footnote 1, 1903 (specimen in Museo Civico di Milano, probably the same taken by Osculati and identified by Osculati and Cornalia [*op. cit., supra*] as *Cebus griscus*).

Cebus gracilis, Cabrera [*nec* Spix], Trab. Mus. Nac. Cienc. Nat., Madrid, ser. zool. No. 31, p. 41, 1917 (Aguano, Río Napo; La Coca, Río Napo; Destacamento, mouth of Río Napo).

Cebus flavescens cuscinus, Festa (*nec* Thomas), Boll. Mus. Zool. Anat. Comp. Torino, vol. 18, No. 435, p. 6, 1903 (part; Granadillas, eastern Ecuador).

Cebus sp. *cf. cuscinus* Thomas, Lönnberg, Arkiv Zool., vol. 14, No. 4, p. 6, 1921 (near Río Curaray, eastern Ecuador).

Cebus castaneus, Rode (*nec* Geoffroy), Bull. Mus. Nat. Hist. Nat., Paris, ser. 2, vol. 9, p. 343, 1937 (Siguín, Río Pastaza, eastern Ecuador).

Holotype.—Adult female, skin and skull, C.N.H.M. No. 41493; collected February 14, 1932, by Ramón Olalla; original number 66.

Type locality.—Montalvo, a site on left bank of Río Bobonaza about 45 kilometers above its junction with the Río Pastaza, an affluent of the Marañón, eastern Ecuador; altitude approximately 500 meters.

Distribution.—Territory between Ríos Marañón and Napo, eastern Ecuador and northeastern Peru.

Characters.—Most gray fronted (sides of face, chest, outer sides of arms) race of *albifrons*. Generally as in *unicolor* but back ochraceous-brown to Prout's Brown, outer side of forelimb sharply contrasted grayish or buffy; underparts, except of tail, extremely pale, silvery to Ochraceous-Orange.

Description of holotype.—Sides of face light Ochraceous-Buff; cinnamon superciliary region with weakly defined brush. Cap Bister; median dorsal region Prout's Brown, sides of back paler grading into Snuff Brown of lateral fringe. Hairs of chest, belly, sides of neck, Light Buff basally, Warm Buff terminally; chin, underside of neck, inner side of forelimb silvery. Outer side of upper arm like side of body, of forearm mixed ochraceous and buffy, anterior (radial) surface of forearm and upper surface of hand, mixed brown and buffy; outer side of hind limb Ochraceous-Tawny, inner side Ochraceous-Buff, upper surface of foot Sayal Brown. Tail above Prout's Brown, beneath Ochraceous-Tawny proximally to Ochraceous-Buff terminally.

Coloration of paratypes (old adult male paratopotype; two males, one adult, and one young female from "Río Napo, abajo").—The paratopotype shows least contrast between colors of front and back; sides of face mixed Cinnamon-Buff and Snuff Brown; dark brown cap with line extending to between eyes; median dorsal band Tawny, side of back and lateral fringe Sayal Brown; chin Pinkish Buff, chest Light Buff, hairs of belly Ochraceous-Buff to Ochraceous-Orange terminally, buffy basally; outer side of upper arm Sayal Brown, of forearm paler, inner surface of arm Pinkish Buff proximally becoming Cinnamon-Buff terminally; outer side of hind limb like sides of back, inner side Cinnamon-Buff proximally to Cinnamon terminally; tail Bister above, below Prout's Brown on proximal half, Ochraceous-Orange terminally, the hairs buffy basally. Young female from Río Napo like holotype but without superciliary brush, a midfrontal line present, sides of face paler. Young and adult male from Río Napo paler throughout than holotype.

Measurements.—Those of the type followed by those of the male paratopotype: Head and body, 370, 430; tail, 450, 470; hind foot, 122, 140; ear, 35, 40; greatest length of skull, 96.0, 106.7; condylobasal length, 68.1, 81.4; zygomatic breadth, 59.9, 70.2; width of brain case, 53.2, 54.2; length of brain case, 74.7, 82.0; orbital breadth, 49.8, 58.9; greatest width across maxillary tooth rows, 29.0, 32.1; length, upper canine to M^3, 27.2, 28.5; length, lower canine to M_3, 29.5, 32.5; mandibular depth at condyle, 24.9, 29.9 mm.

Remarks.—The dominantly grayish forearms, face, and underparts of *yuracus* are most distinctive. The blackish limbed, "tufted" *Cebus apella macrocephalus* extends into the range of the present pale-limbed representative of *Cebus albifrons*. Quechua-speaking Indians of the region distinguish the first by the name *yana-machín* (black, or dark, *Cebus*) from the second which they call *yurac-machín* (white or pale, *Cebus*).

Specimens examined.—Five. Montalvo, Río Bobonaza, 2 (C.N.H.M.); Río Napo "abajo," eastern Ecuador, 3 (C.N.H.M.).

CEBUS ALBIFRONS CUSCINUS Thomas

Cebus flavescens cuscinus Thomas, Ann. Mag. Nat. Hist., ser. 7, vol. 7, p. 179, 1901.—Cabrera, Rev. Real Acad. Cienc. Madrid, vol. 16, ser. 2, p. 229, 1917 (synonym of *gracilis*).

Cebus unicolor cuscinus, Elliot, A review of the Primates, vol. 2, p. 92, 1913.—Thomas, Proc. U. S. Nat. Mus., vol. 58, p. 220, 1920 (Uvini, Río Cosireni, 5,000 feet).

C[ebus] c[uscinus] cuscinus, Pusch, Zeitschr. für Säuget., vol. 16, p. 196, 1941 (part; Chicosa, Urubama records only).

C[ebus] c[apucinus] gracilis, Pusch, Zeitschr. für Säuget., vol. 16, p. 192, 1941 part; Chunchunas, only).

Holotype.—Old female, skin and skull, B.M. No. 98.11.6.1; collected April 21, 1898, by Otto Garlepp.

Type locality.—Callanga, Río Pinipini, upper Río Madre de Dios, Cuzco, Peru.

Distribution.—The Río Urubamba Valley in the department of Cuzco, and the Río Alto Madre de Dios, Peru.

Characters.—As in *unicolor* but less brightly colored; limbs more brown, less contrasted with back.

Uvini, Río Cosireni (adult male and female): Cap Prout's Brown; anterior half of back Ochraceous-Tawny, posterior half Tawny; sides, lateral fringe, and outer side of upper arm Sayal Brown; forearm Orange-Rufous, wrist and upper surface of hand darker, hairs of fingers mixed buffy and brownish. Outer side of thigh like rump, of foreleg Sanford's Brown in female, mixed Orange-Rufous and Mars Orange in male; upper surface of foot Sanford's Brown to Auburn; undersurface of leg in female Ochraceous-Orange proximally to Orange-Rufous distally. Hairs of belly Ochraceous-Orange and silvery becoming Warm Buff and white on chest; whitish patch on front of shoulder and inner side of upper arm. Tail of male Cinnamon-Brown above, Sayal Brown beneath proximally, becoming Cinnamon Buff terminally; of female Sayal Brown above proximally, becoming slightly paler terminally, beneath Ochraceous-Tawny proximally becoming pale buffy terminally.

The above specimens agree closely with the original description except for color of inner surface of forelimbs, which are "bright rufous to the wrists" in the type. Unlike the male, with a broad pale frontal region sharply defining the dark brown cap, the female has a dark brown frontal diadem continuous with the cap. This is the condition in the type specimen, also a female.

Measurements.—Those of an adult male and female from Uvini: Head and body, 400, 390; tail, 440, 475; hind foot, 133, 132; ear 39, 35; greatest length of skull, 96.9, 94.2; condylobasal length, 74.4, 67.8; zygomatic breadth, 63.6, 61.2; width of brain case, 53.9, 53.3; length of brain case, 76.7, 75.7; orbital breadth, 51.0, 49.2; greatest width across maxillary tooth rows, 30.4, 28.7; length, upper canine to M^3, 28.2, 24.9; length, lower canine to M_3, 31.5, 29.3; mandibular depth at condyle, 27.3, 26.7 mm.

Remarks.—Thomas, in recording the same individuals described above, said that they "agree in every detail with the type and confirm its distinction as a local form." Certain of the collector's measurements of the type reproduced in the original description are obviously incorrect. Head and body length given as 340 mm. seems to be too short for an old adult with skull length of 93.5 mm. Tail length of 390 mm. may also be too short though it is not disproportionate to the given head and body length. Hind foot length of 250 mm. is nearly twice normal size.

The sexually restricted peculiarity of the dark brown frontal region, usually associated with a frontal diadem or tuft, was regarded as a significant specific character by Pusch. As the type is one such female, the only one of the species serving as basis for a name, Pusch assigned all similar females from whatever locality to *cuscinus*. A tufted female from Santa Marta, Colombia, induced Pusch to synonymize *malitiosus* with *cuscinus*. Females with dark foreheads recorded by Lönnberg under *gracilis* (see *unicolor* above), were also assigned by Pusch to *cuscinus*. This sexual character, plus the unusually short head and body length ascribed to the type, may have prompted Pusch (1941, p. 219) into pursuing a complicated sequence of imaginary evolutionary processes in an attempt to demonstrate that *cuscinus* was the most primitive species of the genus and most nearly related to *Aotus*.

Specimens examined.—Two. Uvini, Río Cosireni, Cuzco, Peru, 2 (U.S.N.M.).

CEBUS ALBIFRONS AEQUATORIALIS Allen

Cebus chrysopus, Pucheran (*nec* Lesson), Rev. Mag. Zool. Paris, ser. 2, vol. 9, pp. 347–8, 1857 (menagerie specimen said to be from the forests of Guayaquil, Ecuador).

Cebus albifrons, Festa (*nec* Humboldt), Boll. Mus. Zool. Anat. Comp. Torino, vol. 18, p. 6, 1903 (part; Río Peripa and Vinces, Ecuador; *versicolor* and *chrysopus* of Pucheran synonyms).

Cebus flavescens cuscinus, Festa (*nec* Thomas), Boll. Mus. Zool. Anat. Comp. Torino, vol. 18, p. 6, 1903 (part; Vinces, western Ecuador only).

Cebus aequatorialis Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 654.—Lönnberg, Arkiv Zool., Stockholm, vol. 14, No. 4, p. 6, 1921 (Gualea, 3,000 and 5,000 ft. altitudes).—Cabrera, Rev. Real Acad. Cienc., Madrid, vol. 16, ser. 2, p. 230, 1917.

C[ebus] c[apucinus] gracilis, Pusch (*nec* Spix), Zeitschr. für Säuget., vol. 16, p. 192, 1941 (part; western Ecuadorian records only: Mindo, Vinces).

C[ebus] c[apucinus] versicolor, Pusch (*nec* Pucheran), Zeitschr. für Säuget., vol. 16, p. 193, 1941 (part; Guayaquil).

Holotype.—Adult female, skin and skull, A.M.N.H. No. 34273; collected January 7, 1913, by William B. Richardson.

Type locality.—Province of Manaví, western Ecuador; near sea level.

Distribution.—Northwestern Ecuador; coast and western slopes of the Cordillera Occidental to not more than 2,000 meters above sea level.

Characters.—See original description and literature references.

Remarks.—The five original specimens of *aequatorialis*, including one from Gualea, recorded by Allen, were examined by the writer but not compared with material described in this paper. Individuals of the coast are brightly colored, like *unicolor*. Those of the mountains are darker. Lönnberg described specimens from Gualea as darker than topotypes and suggested that they may represent a darker race

intermediate between *aequatorialis* and *malitiosus*. The altitude of 7,000 feet given by Allen for his Gualea specimen appears to be too high for the range of the species.

It cannot yet be demonstrated where the range of *aequatorialis* meets that of any other member of the species *albifrons*. Possibly it grades into what may be regarded as *hypoleucus* somewhere along the Pacific coast of Colombia. On the other hand, the range of *aequatorialis* meets, if it does not actually overlap, that of *Cebus capucinus* in the mountains of western Ecuador. The writer found the black white-fronted species (*capucinus*) in the vicinity of Paramba (altitude, about 1,000 meters) on the western slope of the Cordillera Occidental, in Ecuador. So far as known, *Cebus capucinus* does not occur on the Ecuadorian coast.

Specimens examined.—Five. Manaví, 4 (A.M.N.H.); Gualea, 1 (A.M.N.H.).

CEBUS ALBIFRONS TRINITATIS Pusch

Cebus sp., Thomas, Journ. Trinidad Field Nat. Club, vol. 1, p. 159, 1893 (Trinidad).—Allen and Chapman, Bull. Amer. Mus. Nat. Hist., vol. 5, p. 231, 1893 (Trinidad).

Cebus apella, Vesey-Fitzgerald (*nec* Linnaeus), Tropical Agriculture (Trinidad), vol. 13, No. 6, p. 161, 1936 (Trinity Hills, Trinidad).

C[*ebus*] c[*apucinus*] *trinitatis* Pusch, Zeitschr. für Säuget., vol. 16, p. 194, 1941.

Holotype.—Skin of head, a hand and foot, skull, B. M. No. 32.11. 17.1; collected by Ballou.

Type locality.—Trinidad.

Distribution.—Trinidad.

Characters.—"Head similar to C[*ebus*] c[*apucinus*] *versicolor* but with forehead clearer, more silvery, cap Bister; hand and foot Pinkish Buff to Cinnamon Buff" (a free translation of the original description). A pale form most nearly resembling the pale phase of *cesarae*.

Nariva Swamp, Trinidad (immature male, subadult female): Specimens collected in November 1942 by Raymond Shannon. Female in old pelage with patches of Ochraceous-Buff new pelage in sharp contrast, the gray-brown basal portion of the hairs dominating on surface of back and sides; lateral fringe Light Ochraceous-Buff; frontal diadem Light Buff grading into Bister of nape; outer side of forelimb Ochraceous-Buff to Ochraceous-Orange, inner side Warm Buff to silvery; hairs of upper surface of hand and foot mixed brownish, buffy and silvery; outer side of thigh Ochraceous-Tawny, foreleg paler becoming silvery on inner side; tail above like back, beneath Ochraceous-Buff proximally, becoming paler, to Cartridge Buff, terminally; hairs of belly Ochraceous-Buff and silvery becoming more silvery on chest; long ochraceous hairs with brown tips behind nape tend to form a weakly defined mantle. Immature male paler, in good pelage; cap Prout's Brown, nape and interscapular region

Ochraceous-Buff, remainder of back buffy brown, sides paler, lateral fringe Pinkish Buff; outer side of limbs Ochraceous-Buff, inner side paler, to silvery; upper surface of tail Snuff Brown, the hairs with ochraceous tips, undersurface Ochraceous-Buff proximally to silvery terminally.

Measurements.—Of an adult male and subadult female: Greatest length of skull, 94.2, 89.8; condylobasal length, 69.2, 64.4; zygomatic breadth, 63.6,—; width of brain case, 49.9, 46.5; length of brain case, 77.4, 72.9; orbital breadth, 54.2, 48.9; greatest width across maxillary tooth rows, 29.4, 27.1; length, upper canine to M^3, 26.1, 23.9; length, lower canine to M_3, 29.4, 27.6; mandibular depth at condyle, 28.5, 23.9 mm.

Remarks.—Existence of a form of *Cebus* on the island of Trinidad has been known for a long time. Besides the fragmentary type, there is a specimen in the Paris Museum recorded by Pusch, one each in the American Museum of Natural History and the Chicago Natural History Museum; and in the United States National Museum a skull only, in addition to the two individuals described above. Nearest known relatives of *trinitatis* occur in the upper Orinoco region (*albifrons*) and in the Lake Maracaibo region (*adustus*). On the mainland opposite Trinidad, only *C. nigrivittatus* is known. In the Guianas and the lower Orinoco region both *nigrivittatus* and "tufted" *C. apella* further insulate *trinitatis* from other members of its species. There are alternative explanations for this wide gap in the range of the species. Distribution of *C. albifrons* may have been continuous along the Venezuelan coast before separation of Trinidad from the mainland, or the mico was introduced into the island through human agency. The latter theory is the more probable. Wild, living monkeys are known from a number of American islands. *Cebus apella* is represented in Margarita Island, Venezuela, *C. capucinus* in Gorgona Island, Colombia; remains of an *Ateles*, which may have been a household pet, have been found in Cuba. The only other monkey inhabiting the island of Trinidad is the red howler, *Alouatta seniculus insularis*. Isolation of these monkeys can hardly be accounted for on the basis of natural zoogeographical factors.

Specimens examined.—Three. Nariva Swamp, Trinidad, 3, one with skull only (U.S.N.M.).

GENUS ATELES GEOFFROY: SPIDER MONKEYS, OR MARIMONDAS

The genus *Ateles* has been reviewed recently by Kellogg and Goldman (1944).[3] According to these authors, spider monkeys are repre-

[3] Overlooked by the authors is "*Ateles Beelzebuth* Geoff., Varietas *triangulifera*" Weinland (Zool. Gart. Frankfurt a M., Jahrg. 3, No. 9, pp. 206–207, fig., 1862). The name is based on a menagerie individual of unknown origin. Judged by the description, the type is most probably a representative of one of the Central American races of *Ateles geoffroyi*. For the present, there is no good reason for giving priority to *triangulifera* over any of the later named forms recognized by Kellogg and Goldman.

sented in Colombia as follows: *Ateles belzebuth belzebuth* is found east of the Cordillera Oriental in regions drained by the Orinoco and Amazonas, *A. b. hybridus* occurs in the Río Magdalena, Río Ranchería, and Lake Maracaibo drainage basins, *A. fusciceps robustus* in the Cordillera Occidental, and *Ateles geoffroyi grisescens* (*A. rufiventris* Sclater, a synonym [4]) in northwestern Colombia. The 39 specimens of *A. belzebuth hybridus* collected by the writer in northern Colombia were examined by Kellogg and Goldman (1944, p. 25).

ATELES BELZEBUTH HYBRIDUS I. Geoffroy

Ateles hybridus I. Geoffroy, Mém. Mus. Hist. Nat. Paris, vol. 17, p. 168, 1829; Mag. Zool., Paris, vol. 2, Cl. 1, pl. 1 (1832), 1832 (Magdalena Valley, Colombia).

Ateles albifrons Gray, Catalogue of monkeys, lemurs and fruit-eating bats in the collection of the British Museum, p. 44, 1870 (type locality, South America).

[*Ateles belzebuth*] *brunneus* Gray, Catalogue of monkeys, lemurs, and fruit-eating bats in the collection of the British Museum, p. 44, 1870 (type locality, "Brazil").

Amer-anthropoides loysi Montandon, Comptes Rendu Acad. Sci. Paris, vol. 188, No. 11, p. 817, 1929 (type locality, left affluent of upper Río Tarra, Venezuela, near the Colombian border).

Ateles belzebuth hybridus, Kellogg and Goldman, Proc. U. S. Nat. Mus., vol. 96, pp. 4, 8, 25, 1944.

Lectotype.—Adult female, skin mounted with skull, M.N.H.N. type catalogue No. 75a, accession catalogue No. 519(394). The original description is of "plusieurs femelles et d'un mâle encore jeune." The individual figured in Geoffroy's later description (*op. cit.* 1833, *supra*) is no doubt the original of the one listed by Rode (1938, p. 29) as an adult male and "Holotype." Examination of this specimen reveals it to be an adult female. According to prescribed usage, the specimen should be designated a lectotype. Two cotypes listed by Rode, are number 75b, doubtlessly the "mâle encore jeune" of the original description, and 75c, indicated as a female, is an adult male. The specimens were collected in 1826, by Plée.

Type locality.—Types sent to Paris from the Antilles but supposed to have originated in the Río Magdalena Valley, Colombia. Type locality restricted by Kellogg and Goldman (1944, p. 25) to La Gloria, Río Magdalena, a few kilometers above the mouth of the Cesar, department of Magdalena, Colombia; altitude, 45 meters above sea level.

Distribution.—In northern Colombia, departments of Magdalena, Atlántico, Bolívar, the Santanders, and extreme southeastern portion of the Guajira; in northwestern Venezuela, from the Sierra de Perijá to Lake Maracaibo.

[4] Type an immature; head, tail, upperparts of trunk and limbs black, chest, belly, inner sides of upper arms and thighs rufous (*ex* type, British Museum).

Characters.—Upperparts brown, head, outer sides of forelimbs, and thighs darker than back; forehead with a conspicuous whitish triangular patch; underparts whitish to buffy.

Variation.—Variations in color are described under locality headings listed below. No color differences are apparent between sexes; cranium of female slightly more vaulted in frontal region, the brain case slightly less dolichocephalic than in male; canines of male longer and heavier.

A rudimentary thumb is of common occurrence. In most instances, the bony vestige of the thumb is too short to be detected externally as a digit. In one individual from Guaimaral (U.S.N.M. No. 281779) a vestigial thumb bearing a nail appears on each hand. One specimen from the Río Tarra has a vestigial nailless thumb on each hand. Six other individuals show the rudiment on the right hand only. Greater frequency of obsolescence of the left thumb may indicate a tendency toward right-handedness in *Ateles hybridus*.

La Gloria (two females): One specimen immature; back of other, a flat skin, nearly entirely bare as result either of faulty preservation or improper tanning. Both specimens agree with the large series form the Río Cesar, described below.

Remarks.—Unfortunately the locality designated as typical is represented by poor material. On a geographical basis, however, no better choice could have been made as it is wholly improbable that any other locality from which specimens are available was visited by Plée, collector of the type series. In general, specimens of mammals taken by the writer in La Gloria agree best with corresponding ones secured by Plée. The lectotype of *hybridus* is considerably faded on the left side of body, arm, and foreleg. Otherwise, it is in good condition and agrees completely with average specimens of the Río Cesar series. The adult male cotype in the Paris Museum is darker, more uniformly brown than the lectotype and agrees with darker individuals from the Cesar. The immature male cotype is badly faded but appears to have been grayish or buffy when alive. In this respect it resembles the type of *Ateles albifrons* Gray, which, whatever its original coloration, is now pale buffy with the extremities darker.

The name *hybridus* was elected by Geoffroy on the testimony of Roulin that the vernacular name of the monkey in Colombia is *mono zambo*, or "mulatto" monkey. In Colombia, however, the name *mono* is generally applied to howlers, genus *Alouatta*. The red howler, *A. seniculus*, is known as *mono colorado*, the dark brown howler, *A. palliata*, as *mono zambo*. In Andean countries, *marimonda* is the common criollan name for spider monkeys; *maquisapa* is the Quechua equivalent.

Guaimaral and El Orinoco, Río Cesar (9 males, 10 females): Skin of

face black, long white to buffy hairs of cheek directed dorsoposteriad; gray to buffy circumlabial hairs short and sparse; dark brown superciliary hairs long and erect; conspicuous, triangular-shaped frontal patch white to buffy, the long hairs directed forward and converging toward the median line to form a ridge. Crown Snuff Brown to Bister, the hairs directed forward and overlapping frontal patch. Nape like crown or slightly paler, the hairs directed forward; scapular region paler, from Snuff Brown to Cinnamon-Buff; the hairs forming a whorl; back becoming progressively paler posteriorward, to Pinkish Buff or Light Buff in palest individuals. Lateral fringe like back. Chest, belly, inner side of thigh and ventral surface of tail, except naked terminal one-fourth, sharply defined silvery or buffy, the dark brown skin showing through. Forelimb dark brown like nape or crown, the inner side pale, like chest; outer side of thigh like forelimb, contrasting with pale lower part of back and rump; dark brown of thigh extending on outer side of leg as a band bordered by buffy hairs. Upper surface of tail brown like back, or darker, with terminal one-fourth usually darker than anterior portion.

Río San Pedro, Norosí (one adult female): Darkest specimen of the collection with head and forelimbs almost black; most nearly approached in color by a large male of the Río Cesar series. This heavily pigmented female may represent a dark race isolated from the typical population on opposite side of the Río Magdalena.

Las Marimondas (2 males, 6 females): Like the Río Cesar series but slightly more uniformly brown. One immature, combined head and body length, 188 mm., is thinly haired dirty gray on upperparts. Another immature, head and body, 226 mm., is colored like adults but with the buffy juvenile pelage still evident. Frontal patch is not defined in either juvenal.

Remarks.—The name Las Marimondas was given by natives to this locality in the Sierra de Perijá because of the abundance of spider monkeys, or *marimondas*, there. Few bands of *Ateles* still remain on the western slope of the whole range. Deforestation and persecution by man forced spider monkeys to retreat to the summits and eastern slopes of the Sierra de Perijá. Individuals of the present series were taken on the western slope, in the Río Ranchería drainage system, and on the eastern, or Venezuelan slope, in the Lake Maracaibo system.

Río Tarra (2 males, 7 females): Like the Cesar series but more uniformly colored, less variable individually; average size larger.

Remarks.—Five specimens were taken at Bella Vista, altitude 400 meters, on heights overlooking the author's Tarra camp; the remaining four in the Río Tarra Valley at an altitude of about 200 meters above sea level. The Río Tarra of these spider monkeys is not the same as

the Río Tarra of *Amer-anthropoides loysi*. Both streams are in the same general region on the Colombian-Venezuelan border, both flow in the same direction about 40 kilometers apart and empty into the Río Catatumbo. Spider monkeys collected here are representative of *Amer-anthropoides loysi*, as well as identical with those taken in the Río Magdalena Valley. Various authors have already indicated the identity of *Amer-anthropoides* with *Ateles*. On the basis of the present series Kellogg and Goldman (1944, p. 27) have shown *loysi* to be a synonym of *Ateles belzebuth hybridus*.

GENUS ALOUATTA LACEPÈDE: HOWLERS

Colombian representatives of *Alouatta* are the red *A. seniculus seniculus* Linnaeus and the blackish *A. palliata aequatorialis* Festa. Only the red howler was found by the author in northern Colombia. The 60 examples taken are compared with *A. palliata* and listed and described by localities. A separate section of this report is devoted to a description of the hyoid apparatus of howlers.

ALOUATTA SENICULUS SENICULUS Linnaeus

Simia seniculus Linnaeus, Systema naturae, ed. 12, p. 37, 1766.

Stentor chrysurus I. Geoffroy, Mém. Mus. Hist. Nat. Paris, vol. 17, p. 166, (1828) 1829; Mag. Zool., Cl. 1, pl. 7, 1832.

Mycetes laniger Gray, Ann. Mag. Nat. Hist., vol. 16, p. 219, 1845 (type locality, Colombia).

Alouatta seniculus rubicunda Allen, Bull. Amer. Mus. Nat. Hist., vol. 20, p. 458, figs. 1, 3 (with captions, "*rubiginosa*," *lapsus calami* for *rubicunda*) 1904 (type locality, Bonda, near Santa Marta, Colombia).

Alouatta seniculus caucensis Allen, Bull. Amer. Mus. Nat. Hist., vol. 20, p. 462, figs. 2, 4, 1904 (type locality, Charingo, upper Cauca Valley, Colombia).

Alouatta seniculus bogotensis Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 648, 1914 (type locality, Subía, Cundinamarca, Colombia).

Alouatta seniculus caquetensis Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 650, 1914 (type locality, La Muralla, Caquetá, Colombia).

Type locality.—"*Carthagenae in silvis ad fluvium*," department of Bolívar, Colombia. Lönnberg (1941, p. 8) attempted to prove that the type locality should be French Guiana. His argument was founded on the reference by Linnaeus to *le singe rouge de Cayenne* of Brisson (1756, p. 206), and his apprehension that the red howler of Cartagena might be specifically distinct from that of the Guianas. Such is not the case. All red howlers of northwestern South America are conspecific, and the typical form, by Linnaeus' own restriction, is the one inhabiting the Cartagena region. Cruz Lima (1945, p. 66) discussed and rejected Lönnberg's change of venue. As authority for the Colombian habitat of *seniculus*, Linnaeus cited the collector and botanist Jacquin. Humboldt (1812, p. 342) added the following information: "Le singe appelé *Mono colorado* ou *Singe rouge* à Cartha-

gène des Indes et sur les rives du grand fleuve de la Madeleine, est le *Simia seniculus* de Linné. Le synonyme de Jacquin, rapporté dans le *Systema Naturae*, ne laisse aucun doute sur cette identité, et le célèbre botaniste de Vienne a trouvé ce *Hurleur* á peu près dans le même endroit que nous l'avons trouvé, lorsque nous remontâmes à Mompox par la digue de Mahates." The Canal de Mahates is one of the navigable lower channels of the Río Magdalena that empties into the sea south of Cartagena.

Distribution.—Wooded areas of northwestern South America; from northern Chocó and the Santa Marta region in northwestern Colombia east into western Venezuela, thence south in eastern Colombia, eastern Ecuador and across the Amazon into southwestern Brazil and northeastern Peru.[5]

The red howler occurs throughout Colombia, except in the southwestern portion, from sea level to approximately 2,000 meters above. There are records of both *seniculus* and *A. palliata* from the Cartagena region south to the Río Sinu, from the Río Atrato, and from the Darién in the Chocó.[6] Only *A. palliata* is known from Panama northward and from farther south along the coast of Colombia and Ecuador. The red howler, as in the case of many species of Brazilian origin, crossed the northeastern extremities of the Andes and introduced itself into the Lake Maracaibo drainage basin and the valley of the Río Ranchería in Colombia, thence south into the Cauca-Magdalena and the Atrato drainage basins. This species, while not necessarily the first to enter any area, is certainly among the last of the monkeys to leave it. It is found high and above the altitudinal limits of any other kind of monkey, except possibly *Aotus*, with which it may be found in association at lower altitudes. In areas where all other species of monkeys have been driven out or caused to disappear because of deforestation or isolation from principal sources of food, the red howler may still be found occupying the last isolated stands of timber. Riverine islands are more apt to be inhabitated by red howlers than by any other species of monkey.

Habitat versus geographical variation.—The red howler is a comparatively sedentary animal, sluggish in movement, conservative in habits. Combined with its great ability to survive environmental fluctuations is its small capacity for adaptation to such changes. Under normal environmental conditions this howler, with its enormous vitality and almost complete freedom from predators, will flourish. Its natural

[5] *Alouatta macconnelli* Elliot and *A. seniculus amazonica* Lönnberg are not distinguishable from *stramınea* which, in turn, is but weakly differentiated from typical *seniculus*. It is doubtful that *juara* Elliot (*juruana* Lönnberg, a synonym) and *puruensis* Lönnberg can be separated from *seniculus*. *A. seniculus sara* Elliot, from Sara, Bolivia, and *A. s. insularis* Elliot of Trinidad, appear to be valid subspecies.

[6] In the U. S. National Museum, five specimens of *A. seniculus* and two of *A. palliata aequatorialis* from the lower Atrato and Río Truandó, collected by A. Schott; in the Carnegie Museum, one specimen of *A. p. aequatorialis* from Turbaco, near Cartagena, and two from Lorica at the mouth of the Sinú, collected by M. A. Carriker, Jr.

habitat is the *selva* rich with food and water. However, many series of red howlers taken by the writer appeared to be remnants of erstwhile large populations, confined to small relicts, or facsimiles thereof, of primary forest. In these delimited and altered habitats individual clans of howlers have become isolated from the mass of the population. With continued deforestation these clans will be exterminated. Individuals do persist, however, as long as nature provides them with a suitable tree and its fruit. Unlike their more resourceful, or more adaptative relatives, howlers do not ordinarily supplement their ever-diminishing natural larder with loot from cultivated fields circumscribing their domain. They simply eat less and travel less. Their growth becomes stunted, their resistance to disease and parasites reduced. At the same time they fall easier to predators and become more frequent targets for indiscriminate killing by man. Physical characters of these detached remnants of an otherwise numerous and powerful race are not indications of geographical variation or subspeciation but, rather, of localized degeneration.

Comparisons.—Superficially, the brightly colored, reddish howler, *Alouatta seniculus*, is immediately distinguished from the smaller, blackish *A. palliata*, the only other species of howler found in Colombia (and Ecuador). Striking differences in structure of the hyoid bones of these species is described in a following section. Cranial characters distinguishing the two are not so obvious or so easily defined as external and hyoidal ones. In *seniculus* the skull is longer and relatively narrower, rostrum more projecting, shallow concavity of nasals usually evenly curved from tips to between orbits; in *palliata*, the rostrum is compressed anteroposteriorly, the nasals usually forming an angle between orbital and maxillary regions; ratio of zygomatic breadth to condylobasal length in *seniculus* 63 to 77 percent (60 specimens, northern Colombia), in *palliata* 74 to 83 percent (20 specimens); sphenomaxillary fissure long, well opened in *palliata*, usually reduced or obsolete in *seniculus*; mesopterygoid fossa in *seniculus* widely opened, the walls nearly parallel-sided, distance between bases of hamular processes normally equal to or greater than distance across incisors or crown lengths of either P^{2-4} or M^{1-2}; hamular processes usually slender and elongate, directed back as well as down with tapered tips tending to recurve upward; mesopterygoid fossa in *palliata* narrower, the walls markedly convergent, with distance between bases of hamular processes equal to or less than distance across incisors or crown lengths of either P^{2-4} or M^{1-2}; hamular processes usually short, comparatively broad and bent sharply downward with tips expanded and truncate; foramen magnum in *seniculus* usually subtriangular in outline and higher than wide; in *palliata*, foramen magnum usually subcircular or ovate and as wide or wider than high, the occipital condyles markedly weaker than in *seniculus*

Hyoid bones of adult howlers, genus *Alouatta* (all natural size): *a*, *b*, *Alouatta seniculus seniculus*, males, from northern Colombia, showing variation in shape of bullar and tentorial chambers; *c*, *A. s. seniculus*, female, from northern Colombia; *d*, *A. palliata inconsonans*, male, from Panamá.

Most cranial differences cited by Tate (1939, p. 216) for distinguishing *A. seniculus* from *A. palliata* have been found to be either excessively variable or not applicable to the species in question. Measurements of molariform teeth reveal no significant differences between the two species. Dimensions given by Tate for outer width of incisors (I^2–I^2), 16 mm. in *palliata* and 17.5 mm. in *seniculus*, compare with a range of 13.7 to 15.5 mm. in 20 specimens of the former and 12.6 to 17.2 mm. in 75 specimens of the latter. Opening of malar foramen in Tate's specimens is 2.5 mm. in *palliata* and 7 to 8 mm. in *seniculus*. In present material the opening varies from 2.1 to 5.5 in *palliata* and 2.9 to 6.0 in *seniculus*. The shape of the postglenoid process is in most cases, especially in females, much more ligulate in *palliata* than in *seniculus*, a difference quite the reverse of that given by Tate.

Sexual dimorphism.—The fully adult male with its larger, more robust head and body, its thick lower jaw, and swollen throat covered with a long heavy beard, can always be distinguished from the female, even at a distance. The smallest normal adult male is usually larger than the largest normal adult female of the same series, in nearly all measurements. Tail length is the most notable exception. In females the tail is nearly always relatively longer and, frequently, actually longer than that of some males of the same series. Tail in females averages 56 percent of total length; in males 54 percent. Proportionate length of tails of juvenals is about 58 percent in both sexes. Notable differences between sexes in size and structure of hyoid bone are described later. The sexes do not differ in color or color pattern.

In addition to size, the usual cranial differences between sexes are apparent. In males the canines are longer and thicker, temporal crests more developed and approximated, brain case lower, heavier, and more dolichocephalic, bony rims of orbits heavier, mandible larger, etc.

Description.—Diagnostic characters of the skull have been given, and the hyoid apparatus of *seniculus* is described hereinafter (p. 394). Coloration and measurements of the species are represented by the following descriptions of each series of red howlers collected in northern Colombia by the author. A total of 60 specimens (32 males, 28 females) are described, in addition to 6 topotypes of *rubicunda* Allen, from Bonda, Santa Marta, collected by Mrs. Herbert H. Smith. All specimens listed may be regarded as typical. Variations in color are greatest between age groups, and greater between extremes of any one series than between the average of each of any two series. In no case, however, is the range of variation in color great in any one series. Variation depends principally upon color of hair tips of back. Extent of the pale or dark tipping determines whether an individual is described as being, respectively, in light or dark color phase. Color

of basal portion of hairs is extremely variable in any series and in any one specimen. Generally, however, these are darker in young and very immature individuals than in adults. Cranial characters are, by far, most variable. Skull characters employed by Allen for separating various forms of red howlers described by him are patently individually variable. The few cranial measurements, and the external ones as well, given below may be useful for comparisons with measurements of other species of howlers. They are of no value for differentiating one series from another. In the majority of cases individual measurements represent specimens which, though all adults, are not strictly comparable because of the many peculiarities of the individual, the family or the clan that are linked to them. Highly localized environmental conditions, such as quality and availability of food and water, are of greater significance in growth and development of these very sedentary and sluggish monkeys than in any other species of American simian.

Cerro de la Guayta, near Ciénaga de Guájaro (3 males, 1 subadult; 2 females): Back, between shoulders and rump, Ochraceous-Orange to Xanthine-Orange with the yellower, or buffy, subterminal bands of hairs showing through at surface; basal portions of hairs Ochraceous-Tawny to Cinnamon-Brown. Hairs of lateral fringe like back but longer, especially the Burnt Sienna terminal portions which nearly completely cover the paler proximal portions. Hairs of rump Sanford's Brown to Burnt Sienna terminally, becoming increasingly paler basally except near roots which may be brownish. Interscapular region Burnt Sienna to Mahogany Red or Chestnut in appearance, the Orange-Rufous to Sanford's Brown terminal halves of hairs broken by a Burnt Sienna to Chestnut subterminal band, upper part of basal portion of hairs like tips or slightly paler, lower part darker, becoming dark brown toward roots. Head, chin, fore and hind limbs more or less uniformly Burnt Sienna to Chestnut. Proximal portion of tail like hind limbs, terminally paler, Mars Orange to Xanthine Orange. Hairs of underparts Burnt Sienna to Chestnut.

Measurements.—Those of an adult male and female, respectively: Head and body, 465, 475; tail, 645, 646; hind foot, 146, 142; greatest length of skull, 118.3, 101.5; condylobasal length, 110.1, 93.6; length of brain case, 76.6, 63.4; mastoidal width of brain case, 54.7, —; length of maxillary tooth row (C–M^3), 39.0, 35.4 mm.

Remarks.—The series was taken in the low hill country about midway between Barranquilla and Cartagena and is strictly representative of the original Linnaean *seniculus*. All skulls of the series are damaged. The foregoing measurements are of the two best-preserved specimens. The skull of one adult female is malformed as the result of an injury it must have received in early life. In this

specimen, squamosal process of zygomatic arch and glenoid process of left side are absent. Posterior portion of jugal, together with a remaining fragment of squamous portion have formed a new articulation with temporal portion of brain case. As an accommodation for the shortened arch, the rostrum is distorted to the left. Premolars of left side are bunched together with last (?) premolar situated lingually between first and second. There is a diastema between PM^3 and M^1.

Río San Pedro, Norosí (3 adult females): Indistinguishable from the above except rumps average slightly darker, more differentiated from middle portion of back.

Measurements.—Head and body, 519, 521, 515; tail, 605, 629, 612; hind foot, 146, 140, 159; ear, 34, 34, 39; greatest length of skull, 106.3, 106.5, 109.6; condylobasal length, 96.8, 96.3, 99.1; zygomatic breadth, 66.3, 67.8, 69.4; length of brain case, 67.9, 67.4, 68.0; mastoidal width of brain case, 50.1, 57.5, 52.1; greatest width across maxillary tooth rows, 34.1, 37.7, 36.3; length of maxillary tooth row ($C–M^3$), 39.8, 37.5. 39.6 mm.

Remarks.—The specimens were taken in the foothills of the Cordillera Central at an altitude between 150 and 175 meters above sea level.

La Gloria, Río Magdalena (2 males, 1 immature; 1 female): Practically identical with the Río San Pedro series except base of hairs of middle part of back paler in adult male, darker in immature, and lower half of lateral fringe of immature not sharply defined from side of body.

Measurements.—Those of the adult male followed by those of the female: Head and body, 534, 477; tail, 559 (imperfect), 633; hind foot, 152, 130; ear, 36, 33; greatest length of skull, 118.6, 100.7; condylobasal length, 110.2, 89.1; zygomatic breadth, 77.8, 66.8; length of brain case, 76.6, 69.7; mastoidal width of brain case, 59.3, 50.9; greatest width across maxillary tooth rows, 39.2, 35.7; length of maxillary tooth row, 40.8, 38.9 mm.

Remarks.—The original series of *Stentor chrysurus* Geoffroy, consisting of two adults and one immature, was collected by Plée and sent from the Antilles in 1826 after the collector's death. Only the adults, both mounted, are still preserved in the Paris Museum. No original data accompanied the specimens except for a tag attached to one of them with the notation that its local name was *araguato*. This is the name by which the red howler is known in Venezuela. Natives of Colombia call this monkey *mono colorado*, or simply *mono*. Plée could have become familiar with the name *araguato* during his sojourn in Venezuela and, later, applied the term to the howlers collected in Colombia. It has been shown that other mammals collected by Plée

(*Sciurus variabilis*, *Ateles hybridus*, *Cebus albifrons pleei*) agree with the fauna of the lower Río Magdalena, and *Alouatta chrysurus* can likewise be matched with present specimens of howlers from La Gloria and Río San Pedro, Norosí. The *araguato* of Venezuela, described by Humboldt as *ursina* (=*arctoidea* Cabrera), is a darker race. Geoffroy himself believed the true habitat of *chrysurus* to be the Magdalena Valley of Colombia. Original distinction of *chrysurus* from *seniculus* was based on comparisons with Guianan specimens supposed to be representative of typical *seniculus*. The colored figure of *chrysurus* (*op. cit.*) may be identified as that of a red howler but otherwise has little resemblance to the actual specimens it is supposed to depict.

Bonda (4 males, 2 females): The males similar to the Ciénaga de Guájaro series, but two with darker rumps, two with paler rumps; females in pale phase, dark tipping of hairs of back greatly reduced, terminal halves of hairs like subterminal portions of hairs of backs of males, tail also paler for greater length.

Measurements.—Those of an adult male and female, respectively, external measurements not available: Greatest length of skull, 128.3, 109.4; condylobasal length, 122.5, 98.1; zygomatic breadth, 84.6, 68.9; length of brain case, 80.0, 71.4; mastoidal width of brain case, 63.3, 52.7; greatest width across maxillary tooth rows, 44.1, 37.8; length of maxillary tooth row, 43.5, 39.3 mm.

Remarks.—These are topotypes of *rubicunda* Allen, collected by Mrs. H. H. Smith. As in the case of *chrysurus*, separation of *rubicunda* from true *seniculus* was predicated on the assumption that the type locality of the latter was in the Guianas. Later, in his description of *bogotensis*, Allen (*op. cit.*) affirmed it to be Cartagena, Colombia. The first account of *rubicunda* deals lengthily with the considerable amount of individual variation noted among the 84 specimens of the type series.

Colonia Agrícola de Caracolicito (2 males, 1 immature; 2 females, 1 immature): Adult male in pale phase, adult female slightly darker, with more dark-tipped hairs on back. Immature female with basal portions of hairs of dorsal surface except rump, nearly black, hairs of face and chin darker than usual, arms with a blackish lateral line. Immature male smaller than the female, paler throughout but basal portions of hairs of back still darker than in adults.

Measurements.—Those of an adult male and female, respectively: Head and body, 581, 505; tail, 674, 645; hind foot, 155, 142; ear, 39, 36; greatest length of skull, 125.9, 106.2; condylobasal length, 113.3, 95.7; zygomatic breadth, 78.3, 65.3; length of brain case, 79.8, 67.5; mastoidal width of brain case, 58.0, 49.0; greatest width across maxillary tooth rows, 39.6, 35.1; length of maxillary tooth row, 41.1, 37.9 mm.

El Salado (2 males, 2 females): One male like the adult female from Colonia Agrícola, other specimens darker and indistinguishable from the Ciénaga de Guájaro series.

Measurements.—Those of 2 males and 2 females, respectively: Head and body, 511, 546, 573, 493; tail, 555, 615, 643, 606; hind foot, 145, 155, 146, 144; ear, 36, 38, 36, 35; greatest length of skull, 114.1 111.3, 107.5, 107.1; condylobasal length, 108.1, 107.3, 96.7, 96.0; zygomatic breadth, 80.0, 72.2, 70.4, 66.2; length of brain case, 69.2 68.5, 69.2, 69.4; mastoidal width of brain case, 53.6, 56.2, 53.3, 49.7; greatest width across maxillary tooth rows, 39.2, 41.1, 36.4, 34.7; length of maxillary tooth row, 44.5, 41.8, 37.5, 36.9 mm.

Río Cesar (8 males, 1 immature; 9 females, 2 immature): Most males are in pale phase but average paler than similar individuals of the other series mentioned; most females with hairs of back dark tipped but average slightly paler than the San Pedro and Ciénaga de Guájaro series. Basal portions of hairs of dorsal surface are generally darker in immature or young than in fully adult individuals. The series was taken from August 20 to October 16, 1942, during the rainy season. There is no apparent relationship between date of capture and color phase.

Measurements.—Means and extremes of 7 adult males followed by those of 7 adult females: Head and body, 534 (522–552), 473 (459–501); tail, 657 (602–690), 619 (571–670); ratio of tail length to total length, 55 percent (51–56 percent), 57 percent (54–60 percent); hind foot, 153 (150–160), 143 (138–153); ear, 37 (35–41), 34 (32–36); greatest length of skull, 117.6 (115.6–120.7), 103.2 (101.0–106.3); condylobasal length, 109.4 (107.8–111.6), 92.4 (90.2–94.3); zygomatic breadth, 77.4 (73.0–81.5), 66.1 (62.7–67.7); length of brain case, 74.4 (71.8–77.8), 67.5 (66.4–69.1); mastoidal width of brain case, 56.6 (54.6–58.5), 49.8 (48.2–51.8); greatest width across maxillary tooth rows, 38.0 (36.3–39.8), 35.4 (34.2–36.8); length of maxillary tooth row, 42.4 (40.5–44.1), 35.4 (34.2–36.8) mm.

Villanueva (6 males, two immature; 6 females, one immature): Three males and two females may be classified as pale phase individuals. These do no appear to be quite as pale as the same category of individuals from the Río Cesar. The remaining dark specimens are like those from the Cesar. Altogether, they average slightly darker than the Cesar series. This is the reverse of what has been observed heretofore in comparing other species of mammals from the two localities. The series was taken from January 22 to February 16, 1943, during the dry season.

Measurements.—Those of 3 males and 4 females, respectively: Head and body, 531, 493, 544; 510, 490, 490, 478; tail, 602, 552, 574; 578, 578, 613, 549; hind foot, 155, 140, 143; 143, 132, 143, 145; ear, 36, 34,

35; 35, 35, 36, 32; greatest length of skull, 112.9, 107.4, 111.7; 102.4, 98.4, 102.6, 104.5; condylobasal length, 107.4, 98.4, 105.8; 95.8, 88.4, 97.0, 93.0; zygomatic breadth, —, 69.5, 74.4; 67.9, 64.4, 65.6, 65.2; length of brain case, 74.7, 71.5, 69.1; 66.0, 65.6, 67.5, 69.6; mastoidal width of brain case, 56.5, 51.8, 55.5; 52.3, 48.7, 50.4, 49.5; greatest width across maxillary tooth rows, —, 39.1, 37.4; 35.1, 33.3, 35.3, 35.7; length of maxillary tooth row, 42.1, 42.3, 41.0; 40.0, 36.9, 36.2, 39.6 mm.

Las Marimondas, Sierra de Perijá (5 males, 1 immature; 2 females): Like those from La Gloria, San Pedro, and Ciénaga de Guájaro except pelage longer and more lustrous, lateral fringe and extremities, especially tail, slightly darker.

Measurements.—Those of 4 males and 2 females, respectively: Head and body, 548, 574, 534, 540; 481, 509; tail, 629, 619, 598, 604 (bob); 605, 654; hind foot, 154, 155, 142, 154; 131, 143; ear, 35, 36, 38, 39; 35, 36; greatest length of skull, 116.2, 121.7, 117.3, 127.5; 107.5, 107.5; condylobasal length, 109.2, 112.6, 110.9, 120.3; 97.9, 97.6; zygomatic breadth, 74.7, 80.2, 78.2, 83.9; 67.2, 68.9; length of brain case, 70.6, 76.8, 73.1, 79.1; 69.6, 70.6; mastoidal width of brain case, 55.9, 60.0, 54.3, 62.2; 50.1, 51.8; greatest width across maxillary tooth rows, 40.2, 41.5, 39.6, 47.7; 36.5, 37.1; length of maxillary tooth row, 41.5, 45.0, 41.5, 43.7; 39.7, 38.9 mm.

Remarks.—Cranial measurements of another howler from the Sierra Negra, south of Las Marimondas and above the town of Villanueva are roughly intermediate between those of the two largest males of the above series.

Río Tarra (3 males, 1 female): Like the Las Marimondas series but pelage glossier, extremities slightly darker.

Measurements.—Those of 3 males and 1 female, respectively: Head and body, 538, 565, 606; 537; tail, 748, 705, 643; 673; hind foot, 171, 162, 152; 157; ear, 39, 39, 37; 34; greatest length of skull, 124.8, 126.3, 130.7; —; condylobasal length, 113.3, 118.3, 122.5; 104.3; zygomatic breadth, 76.5, 84.9, 80.6; 66.6; length of brain case, 81.2, 81.6, 83.5; 72.3; mastoidal width of brain case, 57.8, 57.9, 59.6; 52.8; greatest width across maxillary tooth rows, 44.0, 42.8, 41.0; 35.7; length of maxillary tooth row, 44.5, 43.5, 43.5; — mm.

Remarks.—These howlers are by far the largest of the collection. The series from Las Marimondas, in the same general region, averages slightly smaller. Both series are the only ones taken in humid virgin forest. The others are from secondary forests in humid or semiarid climates. The Villanueva and Ciénaga de Guájaro regions are semiarid and largely savanna with isolated stands of scrub forests marked by relatively few tall trees. Apparently, conditions in humid virgin forests are optimum for maximum growth and development of howlers. Of some taxonomic interest is the tendency for the Las Marimondas

and Tarra howlers to be darker than the others. This may indicate intergradation with the distinctly darker *arctoidea* Cabrera (for *ursina* Humboldt, preoccupied). One available specimen of the latter from the París Peninsula, northern Venezuela, is almost blackish in contrast with typical representatives of *seniculus*.

The female skull of the present series is imperfect. An injury to the left side resulted in a fracture of the maxillary and lachrymal portions of the zygomatic arch as well as damage to the orbit itself. The monkey had evidently recovered from the effects of the injury though the wound itself appears to be no more than half healed.

It is rather curious that the only howlers of the collection with important cranial injuries are two females with damaged left zygomatic arches. To this may be added another female of the *A. palliata* group used in this report for comparisons, also with a damaged left arch.

HYOID BONE OF HOWLERS, GENUS ALOUATTA

Hyoid bones of *Alouatta seniculus* (32 males, 28 females) collected by the author in northern Colombia form the principal basis for the following descriptions. Other hyoids of *A. seniculus* from throughout the range of the species have been examined. Further comparisons have been made with hyoids of three males and one female of *A. palliata*, of one male of *belzebul*, of two females of *nigerrima*, of a male and female of *fusca*, and of a male of *caraya*.[7]

The value of the hyoidan structure for classifying species of *Alouatta* was first demonstrated by Ihering (1914). His material consisted of several hyoids representing *seniculus*, *belzebul*, *fusca*, and *caraya*. Lönnberg (1941, pp. 2–5) also made a study of howler hyoids. He described and figured those of a few males of *A. seniculus*, one each from the following localities: Rio Juruá, Brazil; Surinam; Rio Jahu, east of Rio Negro, Brazil; Guamal, on northern frontier between Colombia and Venezuela; and Cartagena, Colombia. Specimens from the first two localities were identified, respectively, as *A. seniculus juruana* and *A. seniculus seniculus*. Those of the last three localities were regarded as different with each representing a possibly distinct species. This conclusion does not appear to be tenable. Lönnberg's published figures of the different kinds of hyoid bones of red howlers of the *seniculus* group hardly show the full range of variation that exists in any large series of *A. seniculus*. The same author also described and figured (*op. cit.*, pp. 24–25, pl. 3, figs. 6a–b) the male hyoid bone of *A. beniensis*, a red howler of the *A. fusca* group. Cruz Lima (1945, pp. 68–69) included some characters of the hyoid in his key to the Amazonian howlers, *A. seniculus*, *belzebul*, and *nigerrima*.

[7] Except for the hyoid of one *A. palliata*, all specimens of the last-mentioned species are in the collection of the Chicago Natural History Museum.

ALOUATTA SENICULUS SENICULUS

PLATE 17, *a-c*; FIGURE 55

Description.—Hyoid (os basihyale) of adult male is a large thin-walled subglobular capsule. Main chamber of hyoid, the bulla, opens behind; width of opening about one-half or less greatest length of bulla; lateral and lower borders of opening subcircular in outline, the rim rounded and, usually, sloping inward. Upper border of opening bounded by rim of a large, rounded, and well-inflated subchamber, the tentorium. Each upper corner, or side, of tentorium marked by a large articular depression for thyreohyal bone. Inner lateral surface of tentorium defined from bulla by bony plates. Each outer side of opening usually provided with a rudimentary cornicule for attachment of stylohyoid ligament; base of cornicule often swollen or inflated. A median ventral plate, sometimes only a line, parts inner surface of bulla. Width and depth of smallest adult hyoid bone examined are 38 by 55 mm., of largest, 55 by 80 mm.

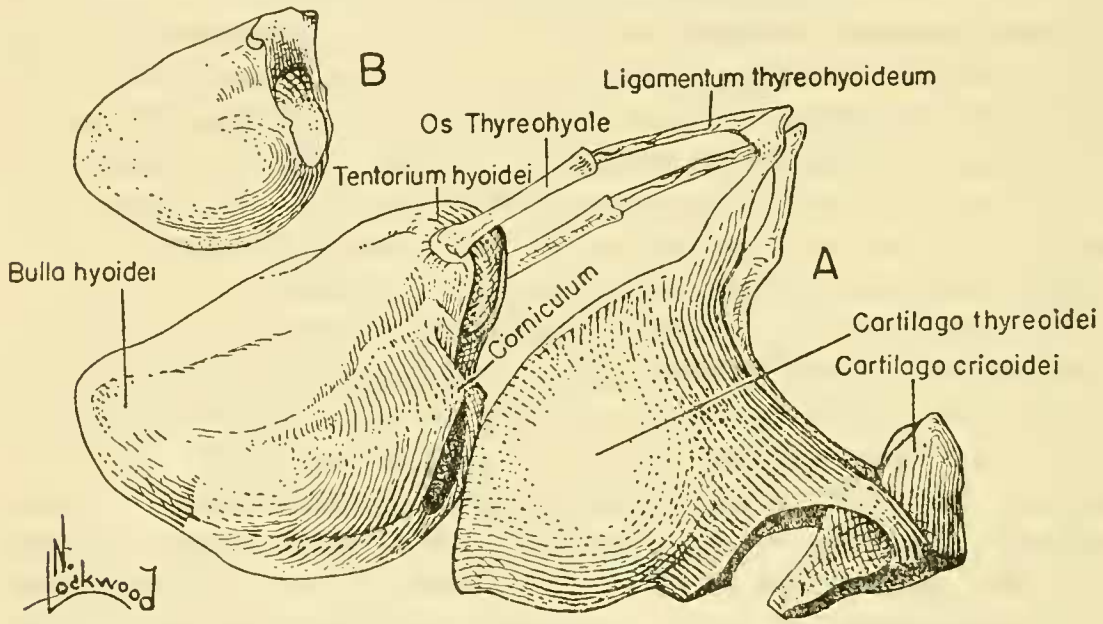

FIGURE 55.—Hyobranchial apparatus of adult red howler, *Alouatta seniculus seniculus* (natural size): *A*, Male apparatus with bullar and tentorial chambers of hyoid bone (os basihyale) indicated; *B*, female hyoid bone. Fusion of thyreoyhal bone and cornu (not found in *seniculus*, cf. *straminea* ♂, fig. 56) form the "cornu majus" of human anatomy.

Female hyoid considerably smaller, less inflated, hence more rectangular in outline; whole inner surface, of bulla and tentorium combined, smooth and without partitions; cornicula slightly more projecting than in male but hardly, or not at all, swollen basally; rim of opening plane, not sloping inward as in male. Dimensions of smallest female hyoid examined, approximately 22 by 38 mm., of largest, 27 by 45 mm. Volume of largest female hyoid between one-fourth and one-fifth that of largest male hyoid.

Variation.—Size and shape of hyoid vary individually and with age. Dimensions are roughly proportional to those of the space

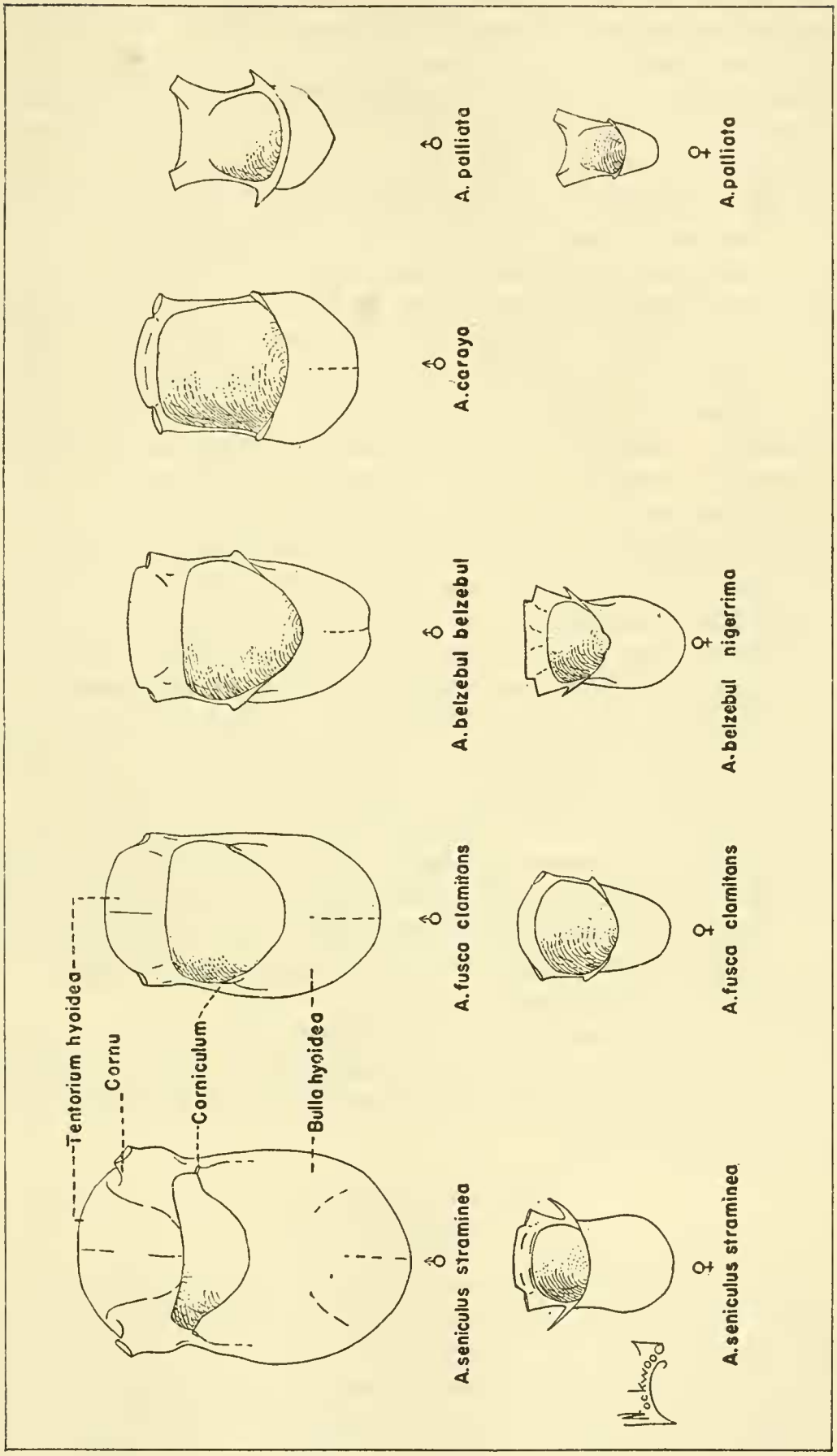

FIGURE 56.—Posterior aspects of hyoid bones of adult howlers, genus *Alouatta* (½ natural size).

between mandibles, but apparently growth of hyoid in a dorsoventral direction is not seriously impeded and may continue indefinitely. Individual peculiarities of pitch, range, timber, and volume of voice of any one howler is reflected by corresponding peculiarities in structure of its hyoid. Most differentiated portions of hyoid of *seniculus* are tentorium, outline and diameters of opening or mouth, the area immediately bordering it, and internal wall of bulla. In males, outline of lamina of tentorium between articular depressions subcircular, oval, crescentic, rectangular, square, triangular, or trapezoidal; surface of lamina convex, plane, or slightly concave, sometimes bilobed; lower border of lamina plane, curved inward, or slightly outward; outline of edge of lamina even, scalloped, or with a slight median incision or projection; dorsal surface of tentorium rounded, flat or angular. Lateral borders of hyoid from articular depressions of tentorium to cornicules may be inflated or compressed, rounded, flat, or angular and with or without ridges and furrows; cornicules moderately developed or obsolete, their bases strongly inflated or slightly burled; inner surface of bulla crossed by numerous anastomosing ridges and trabeculae or traversed by only a short midventral line; inner lateral bony partitions of tentorium variable in development. It may be said, in short, that the male hyoid is a considerably more flexible structure than has been supposed and its development is influenced much more directly by exercise of muscles and chords attached to it than by the genetic constitution of the individual.

Female hyoids are much less specialized and correspondingly less variable in size and structure. Hyoid bones of very young individuals lack tentoria, and hyoids of half-grown males resemble those of adult females. Additional material may prove that characters of the female hyoid are much more reliable for determining real differences and relationships between species of howlers.

Hyoids of red howlers collected in various localities of northern Colombia vary in the same order individually and geographically. External and cranial variations of these same howlers also reveal no constant local differences.

ALOUATTA PALLIATA

PLATE 17, *d*; FIGURES 56, 57

Description.—Hyoid bone of adult male *A. palliata* is even smaller than that of female *A. seniculus*. Greatest width and depth of smallest and largest hyoid specimens at hand, both of fully adult males, are 22 by 33 and 27 by 38 mm., respectively. Entire posterior face of apparatus open with diameter of flaring mouth exceeding depth of shallow conelike bulla. Feature corresponding to tentorium in *seniculus* is here simply a broad extension or lamina, without infolding,

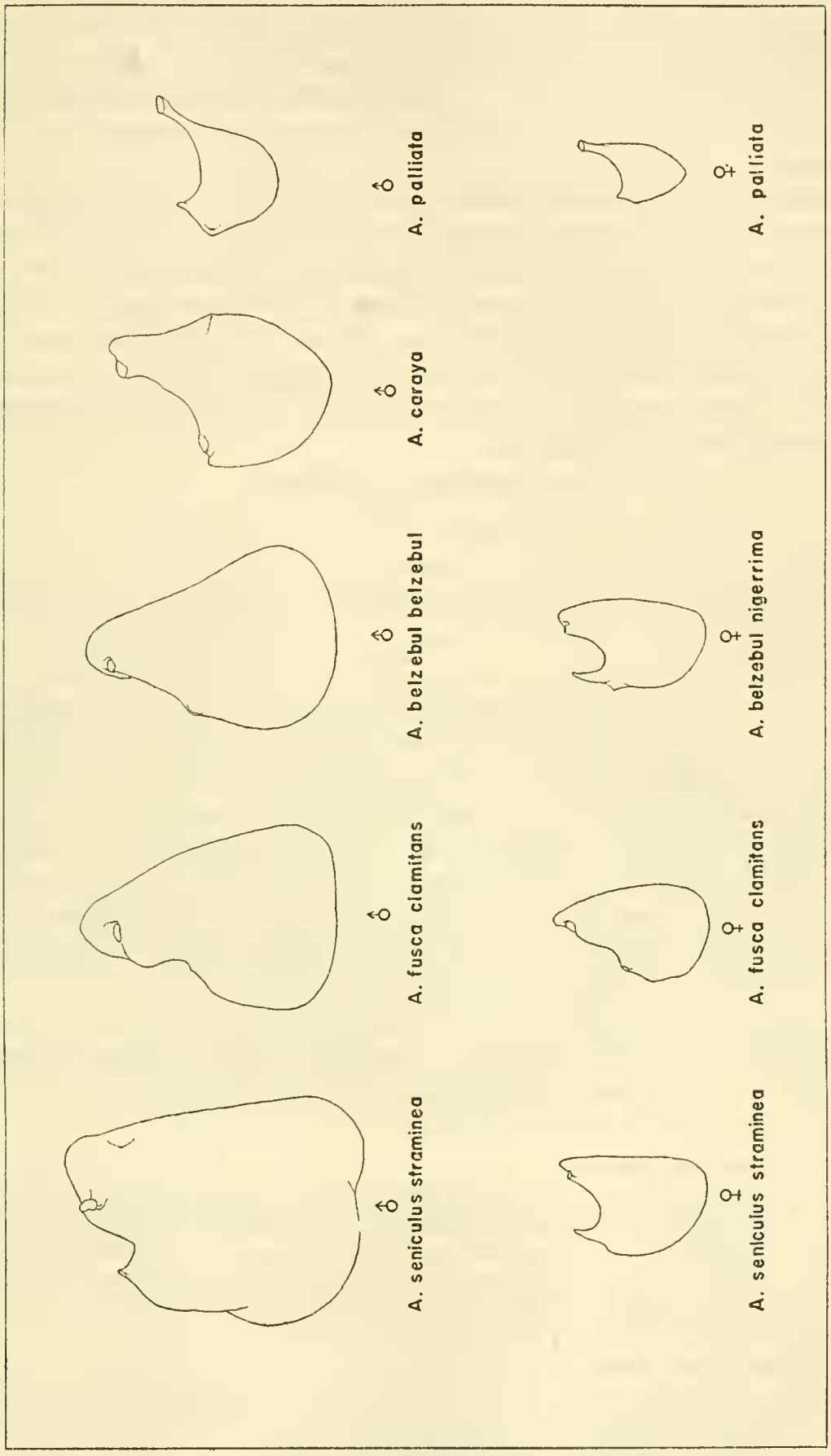

FIGURE 57.—Lateral profiles of hyoid bones of adult howlers, genus *Alouatta* (½ natural size)

of dorsal wall of hyoid bone. Each corner of tentorium projected into a broad cornu for connection with thyreohyal. Near each lower corner of opening a well-developed corniculum for attachment of stylohyoid ligament is present. Inner surface of bone smooth, unmarked by the ridges, or trabeculae characteristic of male hyoid of *seniculus*.

Resemblance between male and female hyoids of *A. palliata* is much greater than that between hyoids of the two sexes of *A. seniculus*. Nevertheless, in both species relationship between sexes in size of hyoid bones is about the same. Greatest width and depth of one female *palliata* hyoid, 14 by 27 mm.; simple tentorial plate less developed than in male hyoid, its superior margin concave; cornicules prominent but only slightly projecting, bulla more saclike, opening less flaring than in male hyoid.

OTHER SPECIES OF HOWLERS

FIGURES 56, 57

Hyoids of *A. belzebul* and *A. fusca* resemble that of *A. seniculus* but are less specialized. The figure of a male hyoid bone of *A. beniensis* Lönnberg (1941, pl. 3, figs. 6a–b), does not reveal important differences by which it can be distinguished from hyoids of the *seniculus* type. The described external and cranial characters of *beniensis* indicate that it may best be regarded as a subspecies of *A. fusca*. Similarly, *A. nigerrima* Lönnberg (*op. cit.*, p. 33), judged by external and cranial characters of two females from Lago do Baptista, east side of the lower Rio Madeira, appear to represent a wholly black race of *A. belzebul*. The hyoid bones of both females are available and show agreement in important characters with that of a male hyoid of *A. belzebul* from Ilha de Marajó. The hyoid bone of *A. caraya* differs considerably from those of the *seniculus* and *palliata* groups.

Characters of hyoid bones of the various species of howlers, based on available material, and figures and descriptions of hyoid bones supplied by Ihering and Lönnberg are summarized as follows:

1. *A. seniculus* group.
   a. *A. seniculus seniculus.*
      Male: Hyoid large, tentorium inflated to form large chamber with bony lateral partitions; cornua absent, tentorium with well-marked articular depression for thyreohyal; cornicula reduced or obsolete; rounded mouth of bulla relatively small, constricted at rim; inner surface of bulla parted by at least a midventral line or bony ridge.
      Female: As described in text, p. 394.
   b. *A. seniculus straminea.*
      Male: As in *seniculus* ("a" above) but short stalklike cornua with rounded articular surfaces present; mouth of bulla smaller, its transverse diameter greater than sagittal diameter.
      Female: As in female *seniculus* but tentorium less inflated, cornicula well developed, long, projecting, and tapering to a point.

c. *A. belzebul belzebul.*

Male: As in male *seniculus* but mouth of bulla larger, sagittal diameter about half greatest depth of hyoid bone, tentorium less developed, without lateral partitions; rudimentary cornua present; inner surface of hyoid nearly entirely smooth.

d. *A. belzebul nigerrima.*

Female: As in female *straminea* but tentorium more inflated (as in female *seniculus*), cornua obsolete.

e. *A. fusca.*[8]

Male: As in male *belzebul* but rudimentary cornua absent, articular depressions for stylohyal as in *seniculus.*

Female: As in female *seniculus* but mouth of bulla larger, occupying about one-half or more posterior surface of drum; tentorium less modified than in *seniculus,* little inflated and hardly or not at all forming a distinct chamber.

2. *A. caraya*

Male: Smaller than in *A. seniculus* group; mouth of bulla large, occupying more than one-half posteroventral surface of hyoid; rudimentary tentorium an extended plate with dorsal edge slightly bent or folded posteriorly but not inflated and without lateral partitions; rudimentary cornua present; cornicula approximately as in *seniculus;* outer dorsal surface of bulla angular and arched; inner surface of bulla smooth.

3. *A. palliata*

As described in text, p. 396.

Remarks.—The most highly specialized hyoid apparatus is found in male *A. seniculus.* The female hyoid of *A. palliata* is least modified and may be nearest that of the ancestral type of howler. The male hyoid of *A. caraya* is intermediate. Here a rudimentary tentorium appears and from this type, the male hyoid of *A. belzebul* can be derived. The male hyoid of *A. fusca* is more specialized, its tentorium more inflated, and it shows a tendency to develop the trabeculae and partitions on inner surface of bulla noted in male hyoid of *A. seniculus.* Relationship between sexes in size of hyoid is about the same in all species and out of all proportions to sexual differences in external and cranial characters. Throughout, the female hyoid is less modified than that of the male. Greatest structural differences between the sexes are found in hyoids of *A. seniculus,* the least in those of *A. palliata.*

GENUS AOTUS ILLIGER: NIGHT MONKEYS, OR MICOS DE NOCHE

Ten specimens of night monkeys were secured in northern Colombia. Five are from Norosí, department of Bolívar, three from the Sierra Negra, Sierra de Perijá, the remaining two from El Orinoco, Río Cesar. Each series differs markedly in many external and cranial characters from the other two. Abundant comparable material

[8] Subspecies of *fusca* include *beniensis* and *clamitans* (*A. fusca guariba* Ihering, preoccupied by *guariba* Humboldt, replaced by *clamitans* Cabrera, 1940 [antedates *iheringi* Lönnberg, 1941, also proposed as a substitute]).

available from intermediate localities and from surrounding areas proves, however, that these characters are simply variations of the individual or of its family unit and are not representative of the entire population of a given locality. Apart from individual differences, cranial variations correlated with growth, maturation and senescence of the individual, are most remarkable and defy all attempts to define them. Other than usual organic differences between sexes are not apparent.

As a rule, a family unit consisting of adult male and female and, ordinarily, two young, nest together in the hollow trunk of a large tree. Any greater number of individuals, including more than two sexually mature individuals, living in the same nest, is more likely to be the result of inbreeding than of a fortuitous association. This is indicated by the uniformity in most characters within such a "series." At the same time, the characters of such a "series" may be strikingly different from those of other night monkeys of the same locality.

The genus *Aotus* is monotypic. Humboldt (1812, p. 306, ed. 2) in describing *Simia trivirgata*, the first specific name proposed for the genus, remarked that it represented a new family of monkeys "que l'on pourroit désigner par le nom d'*Aotes*." The name refers to an alleged lack of external ears in night monkeys. Later on in the description, Humboldt repeated his observation that the monkey in question belonged to a new family, or perhaps to a "nouveau genre de quadrumanes, celui des *Aotes*." Consequently, a number of authors (Jardine, Palmer, Ribeiro, Strand, Simpson) have adopted *Aotes* as the generic name. However, Cabrera (1939, p. 6) rejected *Aotes* in favor of the more commonly cited *Aotus* Illiger on the ground that Humboldt used *Aotes* as a vernacular name. This interpretation is not tenable. The vernacular name for night monkeys used by Humboldt is *douroucouli*, and the French vernacular of *Aotes* is rendered *aôtes*. It is this last form, not used by Humboldt, that is "quoted" by Cabrera in his argument against the validity of *Aotes* as a generic name. An identical misquotation is given by I. Geoffroy (Voyage, la *Venus*, p. 48, 1855), and this may have been a source of Cabrera's conclusions. The only basis for rejection of *Aotes* is Humboldt's own lack of uniformity and consistency in the use of this superspecific designation. *Aotes* was first proposed in 1809 (*fide* Sherborn, Ann. Mag. Nat. Hist., ser. 7, vol. 3, p. 428, 1899) as a family, then as either a family or perhaps a genus to contain *Simia trivirgata*. In 1811, Illiger established *Aotus* clearly and indisputably as the generic name for night monkeys typified by *Simia trivirgata* Humboldt. Humboldt then adopted Illiger's *Aotus* in 1812 (*op. cit.*, pp. 320, 358).

Each of the many names proposed for local forms of the genus has been based in part or in whole on the structure of the most variable parts of the skull and the equally variable pattern of head markings. Real or imaginary anomalies have also figured among "specific" characters of named forms. External ears in the first described *Simia trivirgata* were said to be nearly obsolete. The last described, *Aotus bidentatus* Lönnberg, is based on an anomalous individual with a single pair of upper incisors. The author has examined the type specimens of *Aotus* in the British Museum (*nigriceps, lanius, senex, gularis, miconax, microdon, boliviensis*) and those conserved in the Paris Museum (*lemurinus, oseryi, spixii,* and *Nocthora trivirgata* Cuvier, not Humboldt). No valid specific differences were noted between any of these. On the contrary, individual variation among these types is such that some of them differ less from each other than they do from their respective cotypes or topotypes. Characters devised by Tate for members of the "*aversus* division" (included: *lanius, griseimembra, pervigilis, zonalis, bipunctatus, lemurinus*) and for the "*trivirgatus* division" (included: *infulatus, nigripes* [*nomen nudum*], *senex, vociferans, oseryi, gularis, spixi* [*sic*], *miconax, nigriceps*) appear to have been derived from specimens selected at random and from type specimens preserved in the American Museum of Natural History. Type specimens in the British and Paris Museums do not yield to Tate's characterizations. At best, some of these types straddle both his divisions. Cranial characters described by various authors for distinguishing the "species," must be discounted in their entirety. Large series of comparable skulls demonstrate their unreliability. External variations among night monkeys include a gray and brown color phase with all stages of intermediacy; pelage short, soft and dense to long, coarse and lax; head markings vary individually to such an extent that no one pattern is found to be locally constant. More often than not head markings described from a dried skin are determined by the manner in which the skin was prepared and dried; length of pelage further defines the ultimate appearance of head markings in the dried skin.

There appear to be several well-marked geographic forms of the genotype and only species. *Aotus trivirgatus trivirgatus* Humboldt [9] is the name for the night monkey of the Orinoco and a greater part of the northern and upper Amazonian regions. *A. t. azarae* Humboldt (*miriquouina* Geoffroy antedated), a well-defined form, occurs in the Chaco of Paraguay, Brazil, Bolivia, and Argentina. *A. t. roberti* Dollman of the Serra da Chapada, Matto Grosso, Brazil, grades into *azarae*. The brownish *A. t. lemurinus* Geoffroy is the night monkey

[9] With synonyms *humboldtii* Illiger, *duruculi* Lesson, *infulatus* Olfers (antedates *infulatus* Kuhl), *felinus* Spix, *vociferans* Spix, *commersonii* Vigors and Horsfield, *oseryi* Geoffroy and Deville, *gularis* Dollman, *senex* Dollman, and *spixii* Pucheran, based on a menagerie specimen of unknown origin.

of the Colombian Andes, while *A. t. microdon* Dollman, *nigriceps* Dollman (*miconax* Thomas, a synonym), and *A. t. boliviensis* Elliot (*bidentatus* Lönnberg, a synonym) are parallel forms distributed along the Ecuadorian, Peruvian, and Bolivian Andes, respectively. In the following account only the night monkeys recorded from Central America and western Colombia are discussed in detail.

Vernacular names of night monkeys are derived from their external appearance or resemblance to other, better-known animals, from their special markings, and from their habits and cries. These are, of course, the principal basic origins of vernacular names for other animals as well. In many parts of Colombia, *Aotus*, in common with *Potos flavus* and *Caluromys laniger*, is known as *marta* or its variants, *martica* and *marteja*. The name *marta* was applied by Spanish colonizers to these species because of a casual resemblance between them and the European marten in size, arboreal habits, and texture and color of fur. In Colombia and Venezuela the indigenous name *cusicusi* is also used indiscriminately for *Aotus*, *Potos*, and *Caluromys* because of this same sort of similarity. The descriptive names *cari-rayado* and *cuatro ojos*, invented by the Spaniards, have no known equivalent in any native tongue. According to Humboldt the name *duruculí* (*douroucouli* in French phonetic) is applied to *Aotus* by the Marabitanas Indians. This name, like *ei-a*, also used in the upper Rio Negro-Orinoco region, is derived from what is heard as the cry of the night monkey. In southern Brazil and in the Chaco, the Guaraní name *mirikiná* is commonly used. Throughout the range of the genus the most prevalent names for *Aotus* are the Spanish *mico* (or *mono*) *de noche*, the Portuguese *macaco de noite*, and the Quechua-Spanish combination, *tuta mono*, all meaning night monkey. A nearly related name of very little usage, though common in literature, is the Spanish *dormilón*, or sleepy-head.

AOTUS TRIVIRGATUS GRISEIMEMBRA Elliot

P[ithecia] hirsuta, Schott (*nec* Spix) Exec. Doc., vol. 7, No. 9, 36th Congress, 2d session, appendix E, zoology, p. 214, 1861 (Río Sucio, near mouth at Río Atrato).

Nyctipithecus felinus, Bangs (*nec* Spix), Proc. New England Zool. Club, vol. 1, p. 102, 1900 (Santa Marta, Colombia).

Aotoes [*sic*] *lemurinus*, Allen (*nec* Geoffroy), Bull. Amer. Mus. Nat. Hist., vol. 20, p. 465, 1904 (part; Bonda; Valparaiso).

Aotus griseimembra Elliot, Bull. Amer. Mus. Nat. Hist., vol. 31, p. 33, 1912.—Allen, Bull. Amer. Mus. Nat. Hist., vol. 31, p. 95, 1912 (Cereté, Río Sinú, Bolívar); vol. 35, p. 235, 1916 (Colombia: Hacienda Cincinnati; Bonda; Valparaiso).

Aotus zonalis Goldman, Smithsonian Misc. Coll., vol. 63, No. 5, p. 6, 1914 (type locality, Gatun, Canal Zone, Panamá).—Allen, Bull. Amer. Mus. Nat. Hist., vol. 35, p. 235, 1916 (Colombia: Río Sinú, Bolívar).—Anthony, Bull. Amer. Mus. Nat. Hist., vol. 35, p. 374, 1916 (Panamá: Boca de Cupe;

Tapalisa).—Goldman, Smithsonian Misc. Coll., vol. 69, No. 5, p. 225, 1920 (Panamá: Gatun; Boca de Cupe; Cana; Tapalisa).—Allen and Barbour, Bull. Mus. Comp. Zool., vol. 65, p. 272, 1923 (Panamá: Río Jesusito).

[?] *Nyctipithecus rupifes* Sclater, Proc. Zool. Soc. London, 1872, p. 3, pl. 1 (type locality, San Juan del Norte, Nicaragua).—Alston, Biologia Centrali-Americana, p. 15, 1882 (description and comments on type specimen; type locality questioned).

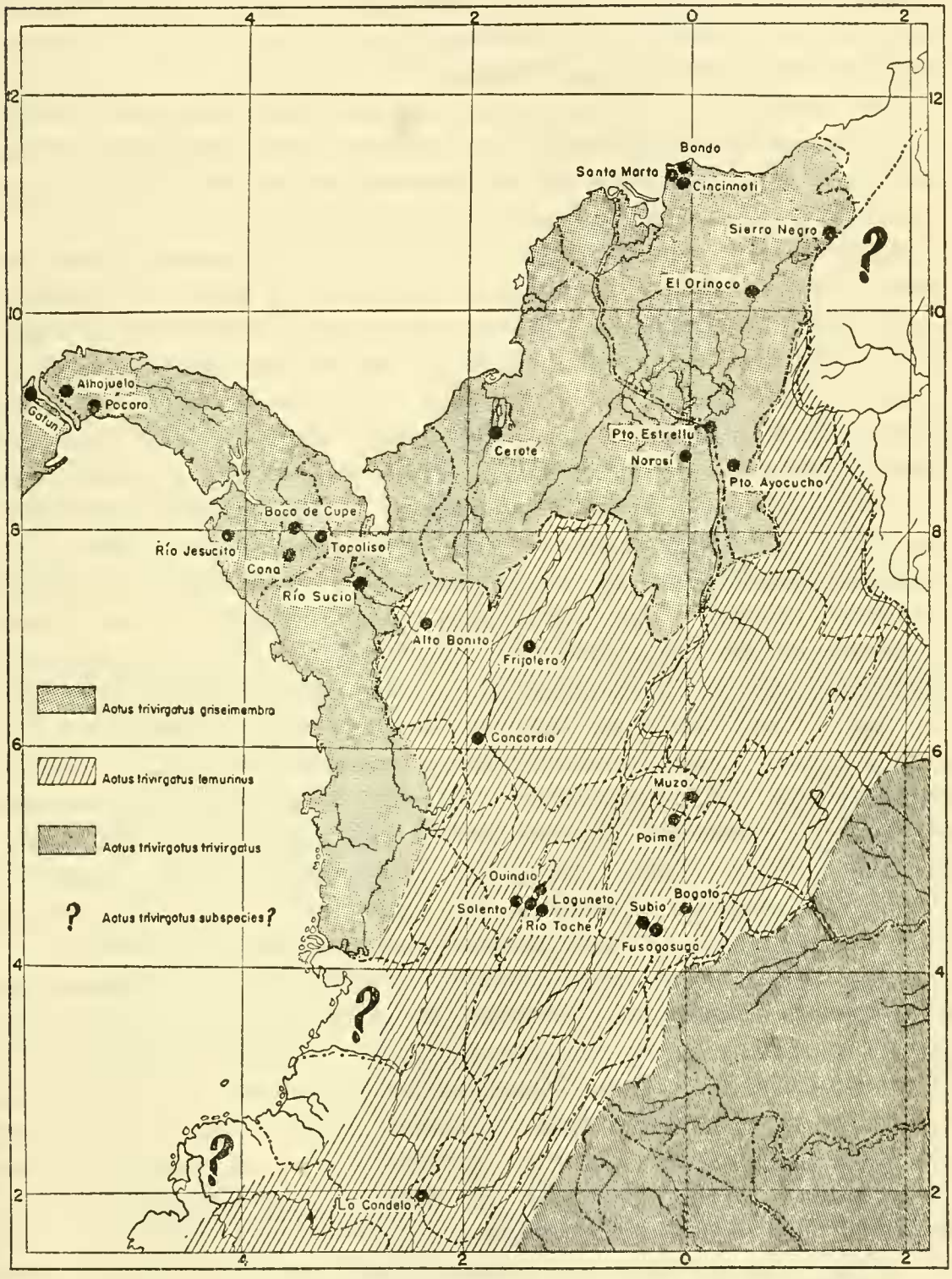

Figure 58.—Distribution of subspecies of *Aotus trivirgatus* found in Colombia and eastern Panamá. Collecting localities shown.

Holotype.—Adult male, skin and skull, A.M.N.H. No. 32664; collected July 20, 1911, by M. A. Carriker, Jr.

Type locality.—Hacienda Cincinnati (formerly known as Valparaiso), northeast of Santa Marta, on northwestern slope of the Sierra Nevada de Santa Marta, Magdalena, Colombia; altitude, 1,480 meters.

Distribution (map, fig. 58).—Canal Zone and eastern portion of Panamá; in Colombia, departments of Magdalena, Atlántico, Bolívar, northwestern Antioquia, and Chocó.

Characters.—As in *trivirgatus* but median dorsal band less sharply contrasted with sides of back; distinguished from *lemurinus*, by more uniformly paler coloration throughout, pelage shorter, the guard hairs and dark tipping of cover hairs of back reduced.

Remarks.—In general, night monkeys of the coastal plains are more warmly colored throughout than those of higher altitudes in the Serranía del Darién (Cana, approximately 600 meters), the Sierra Nevada de Santa Marta (Cincinnati, 1,400 meters) and the Sierra de Perijá (Sierra Negra, 1,300 meters). Apparently specimens from these montane localities have developed along parallel lines and become grayer, with pelage laxer. In no case is any of these populations sufficiently differentiated from its lowlands neighbors to warrant subspecific recognition for it. Specimens from Canal Zone, Panamá (*zonalis*), are in brown phase with upper surface of hands and feet blackish. These gradually grade into paler, grayer forms, in the upper Río Tuyra Basin, on one hand, but continue practically unchanged into the lowlands of the Atrato, Sinú, and Magdalena, on the other. In Colombian localities, however, upper surface of hands and feet are more commonly brown, less contrasted with forearms and forelegs. Night monkeys of the Río Cesar Valley are in gray phase like a topotype of *griseimembra* but with ischial region more brightly orange. Three specimens from Sierra Negra, Sierra de Perijá, also grayish, differ from the topotype by their laxer pelage, paler midventral region and browner terminal portions of tails.

Subspecific separation of northern Colombian and Panamanian *griseimembra* from typical *trivirgatus* is maintained pending examination of material from intermediate localities. Gray phase individuals of *griseimembra* from Canal Zone (Alajuela) and from the Río Cesar, Colombia, are almost identical with a near topotype of *trivirgatus* from Puerto Ayacucho, Río Orinoco. Similarly, brown-phase individuals from almost anywhere within the range of *griseimembra* can be matched with brown-phase topotypes of *trivirgatus*. The night monkey of the Azuero Peninsula, Panamá, described as *Aotus bipunctatus* is certainly a member of the common species but requires further comparison with additional material to determine its exact relation-

ship to *griseimembra*. Most characters of *bipunctatus* described as distinctive, appear to be, rather, individual variables.

The specimen described by Sclater as *Nyctipithecus rufipes* was received alive from San Juan del Norte, Nicaragua, by the Zoological Society of London. The original description and color plate indicate that the type most probably originated in Brazil and was transported as a pet to Nicaragua. The monkey cannot be identified with *griseimembra*. Its inclusion under this heading is for convenience of those interested in disposition of Central American records for the genus. So far, there is not one authenticated record of the occurrence of the genus in Central America outside of Panamá. Another specimen recorded by Sclater from "Costa Rica" is listed under *lemurinus* as it almost certainly originated in the highlands of Colombia.

Specimens examined.—Twenty-nine. COLOMBIA: Hacienda Cincinnati, 1 (A.M.N.H.); Santa Marta Mountains, 2 (M.C.Z.); Puerto Estrella, Río Magdalena, above El Banco, 1 (U.S.N.M.); Ayacucho, 25 kilometers east of La Gloria, Magdalena, 1 (U.S.N.M.); El Orinoco, Río Cesar, 2 (U.S.N.M.); Sierra Negra, Sierra de Perijá, 3 (U.S.N.M.); Norosí, Bolívar, 5 (U.S.N.M.); Cereté, Río Sinú, Bolívar, 2 (A.M.N.H.); Río Atrato, Chocó, 1 (U.S.N.M.). PANAMÁ: Gatun, 3, including the type of *zonalis* (U.S.N.M.); Río Indio, near Gatun, 1 (U.S.N.M.); Alajuela, Canal Zone 1 (U.S.N.M.); Pacora, 1 (U.S.N.M.); Boca de Cupe, 3 (U.S.N.M.); Cana, 2 (U.S.N.M.).

AOTUS TRIVIRGATUS LEMURINUS I. Geoffroy

N[yctipithecus] lemurinus I. GEOFFROY, Comptes Rendus Acad. Sci., Paris, vol. 16, p. 1151, 1843; Zoologie de la *Venus*, pp. 70, 115, 1855; Atlas de zoologie de la *Venus*, pl. 3, figs. 1–9, 1846.

Nyctipithecus lemurinus I. GEOFFROY, Arch. Mus. Hist. Nat., Paris, vol. 4, p. 24, pl. 2, 1844.—GRAY, Catalogue of monkeys, lemurs and fruit-eating bats in the collection of the British Museum, p. 58, 1870 (Santa Fé de Bogotá).—MARTÍNEZ, Ann. Soc. Española Hist. Nat., Madrid, vol. 2, p. 243, 1873 ("Bogotá").—SCLATER, Proc. Zool. Soc. London, 1872, p. 3 (Bogotá; Costa Rica).

Aotus lemurinus, ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 35, p. 234, 1916 (Fusagasugá, type and topotype of *aversus* Elliot; *vociferans* Elliot, not of Spix= *lemurinus* Geoffroy).—ANTHONY, Amer. Mus. Nov., No. 54, p. 9, 1923 (Muzo, northwest of Bogotá).

Aotoes [sic] lemurinus, ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 20, p. 465, 1904 (part; Santa Fé de Bogotá; upper Cauca Valley, altitude 6,000 feet).

A[otus] lemurinus, CABRERA, Trab. Mus. Cienc. Nat., Madrid, No. 11, p. 27, 1912 (Bogotá).

Nyctipithecus vociferans, SCLATER, (*nec* Spix), Proc. Zool. Soc. London, 1890, p. 98 (mountains of upper Magdalena Valley, Tolima).—ALSTON, Biologia Centrali-Americana, p. 14, 1882, part (authenticity of Costa Rican locality of *Nyctipithecus lemurinus* Sclater, 1872, doubtful).

Aotus vociferans, ELLIOT (*nec* Spix), A review of the Primates, vol. 2, p. 13, 1913 (part; *Nyctipithecus lemurinus* Geoffroy in synonymy).

Nyctipithecus felinus GRAY (part, *nec* Spix), List of the specimens in the collection of the British Museum, p. 14, 1843 (Santo Fé de Bogotá).

Nyctipithecus Commersonii, GRAY (*nec* Vigors and Horsfield), Ann. Mag. Nat. Hist., ser. 4, vol. 11, p. 468, 1873 (neighborhood of Concordia, Antioquia).

Nyctipithecus villosus GRAY, List of the osteological specimens in the collection of the British Museum, p. 6, 1847 (type locality, Santa Fé de Bogotá).

Nyctipithecus hirsutus GRAY, Catalogue of monkeys, lemurs and fruit-eating bats in the collection of the British Museum, p. 58, 1870 (*nomen nudum*, a *lapsus calami* for *villosus* Gray, placed in synonymy of *lemurinus* Geoffroy).

Aotus lanius DOLLMAN, Ann. Mag. Nat. Hist., ser. 8, vol. 4, p. 202, 1909 (type locality, mountains of Tolima, Colombia, altitude 6,000 feet).—ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 31, p. 95, 1912 (Río Toché, Tolima); vol. 35, p. 235, 1916 (Río Toché; Salento; West Quindío Pass; near Cali; La Candela [type and paratypes of *pervigilis* Elliot]; La Frijolera; Alto Bonito).—THOMAS, Ann. Mag. Nat. Hist., ser. 9, vol. 20, 1927 (neighborhood of Bogotá).

Aotus aversus ELLIOT, Bull. Amer. Mus. Nat. Hist., vol. 32, p. 251, 1913 (type locality, Fusagasugá, Cundinamarca).

Aotus pervigilis ELLIOT, Bull. Amer. Mus. Nat. Hist., vol. 32, p. 252, 1913 (type locality, La Candela, Huila).

Lectotype.—Adult male (?), skin mounted, skull separate, M. N. H. N., type catalog No. 102a, accession catalog No. 486 (545); purchased in 1842 from Parzudaki. The original description is based on skins and skulls of males and females of various ages. The specimens were received from several sources and originated in different localities in the Colombian Andes. None was originally designated as type. The specimen listed by Rode (1938, p. 37, Cat. Type Spec.) as holotype should be designated lectotype, instead. The only other known specimen of the original series, a lectoparatype, is also listed by Rode, but as an allotype. Both specimens have been examined by the writer. The lectoparatype, according to information on the stand on which it is mounted, was also purchased from Parzudaki in 1842. The colored figure of *lemurinus* accompanying the secondary description (*op. cit.*, 1844, pl. 2) differs in important respects from the original description. The two heads of *lemurinus* figured in the Atlas de Zoologie (*op. cit. supra*, figs 1–2), are of two different animals and neither of them the same as that of the earlier figure. It is problematical which of the three figures, if any, was modeled after the specimen now designated as lectotype.

Type locality.—In the first description, an abstract (*supra cit.*), the type locality is given simply as "Nouvelle Grenade," with a statement that several specimens had been collected by Goudot. In the complete description (1844, *op. cit. supra*), Geoffroy declared that the type series originated in "Santa Fé de Bogotá." This locality must be interpreted in its broadest sense. The name not only applies to the town of Bogotá but was often used to designate the whole interior of the country. In this account Geoffroy quoted Goudot as follows, "Ce petit quadrumane habite les grands bois de la région tempérée du Quindíu, dans la Nouvelle-Grenade, depuis 1,400 mètres,

et même bien plus haut." As *Aotus* does not occur in the Bogotá region proper, which is savanna, the type locality is here restricted to that of the Goudot specimens. This is the only authentic locality for specimens of the original series. Ample material from forests of the Quindío (Cordillera Central, department of Caldas) is available and more has been recorded in literature. Specimens from localities in the typical region (Quindío Pass, Laguneta, etc.) conform to the original description in every detail.

Distribution.—Forested parts of the Colombian Andes exclusive of the northern half of the Sierra de Perijá.

Characters.—Average darkest of the races; pelage extremely coarse, long and lax.

Remarks.—The "diagnostic" characters of *lemurinus* are premised on evidence that the majority of specimens from the interior of Colombia live at higher altitudes than those of the coast and show, consequently, longer, coarser, and laxer pelage. Beyond this no single character serves to unite individuals here held to represent *lemurinus* into an assemblage distinct from all others. Variation in color and character of pelage is so great among these night monkeys that two discreet family groups of the same locality are apt to differ more from each other than either of them from a series of any other locality in the Colombian Andes. Specimens from the typical region in the Río Cauca drainage of the Cordillera Central include individuals inseparable from others throughout the range of the genus. The partial synonymy of *lemurinus* given above reflects the variability of the race.

Aotus lanius Dollman was described as "a mountain form allied to *Aotus trivirgatus*." Neither comparison with nor reference to *lemurinus* Geoffroy was made. The type is the same specimen previously identified by Sclater (*op. cit.*, 1890) as *vociferans*. A specimen from the Río Toché, a stream descending from the southern flank of Mount Tolima and draining into the Magdalena, may be regarded as strictly representative of *lanius*. It is richly brown in color and almost indistinguishable from a brown phase individual of *lemurinus* from the typical Quindío region across the divide in the Río Cauca drainage. As in the preceding, descriptions of *aversus* and *pervigilis* by Elliot include no reference to *lemurinus* and, it may be added, the vague *villosus* Gray, 1847, from the same general region. Topotypes of *aversus*, from Fusagasugá in the Magdalena Valley, southwest of Bogotá, are in pale brown phase with a well-defined blackish median dorsal band. This last character is not so uniformly clear in any of the available series from the Cordillera Central. These topotypes differ even more widely from the typical series of *aversus* and serve to emphasize the lack of consistency in characters of this or any other group of night monkeys described from Colombia. No two series

from other localities in the same general region as Fusagasugá show anything in common with topotypes of *aversus*. Two specimens from Subia, west of Fusagasugá, are in dark gray color phase with pelage longer and laxer than in any other specimens seen. Dark guard hairs of dorsal surface are extremely developed in these specimens. Of three specimens from Paime, two are dark gray, one pale brown. Pelage of these individuals is shorter and finer than in others mentioned, and they could just as well be included with *griseimembra* as with *lemurinus*. Two specimens from Muzo, lower down the Magdalena Valley, are more richly brown on dorsal surface, their pelage fine; only geographical considerations incline one to assign them to *lemurinus* rather than to *griseimembra*. On the other hand, two topotypes of *pervigilis* Elliot, from the head of the Magdalena Valley, at the southern extreme of the range, are similarly brown in color but with pelage long, lax, and coarse. Three specimens from Alto Bonito, Río Sucio, Antioquia, at the opposite extreme of the range, are like topotypes of *pervigilis* except for darker upper surface of hands and feet and more sharply defined head markings.

The *Nyctipithecus lemurinus* recorded by Sclater (*op. cit.*) was said to have been collected in Costa Rica by van Patten. The monkey was described as agreeing "in every respect with the skin of the same animal from Bogota." Alston (*op. cit.*) examined the specimen and questioned the authenticity of its origin in Costa Rica, a country outside the known range of the genus. Alston added that indicated localities of other material collected by van Patten "have not always been free of doubt." As both cited authors agree that the monkey in question is identifiable with the night monkey of the Colombian highlands, the Costa Rican locality may be disregarded and the specimen referred to *lemurinus*.

Specimens examined.—Forty. Salento, Caldas, 1,895 meters, 11 (A.M.N.H., 6; U.S.N.M., 5); Laguneta, Quindío Trail, Caldas, 2 (U.S.N.M.); West Quindío, Caldas, 9,000 feet, 2 (A.M.N.H.); Quindío Pass, southwest of Mount Tolima, 1 (U.S.N.M.); Río Toché, Tolima, 1 (A.M.N.H.); Fusagasugá, Cundinamarca, 1,746 meters, 7 (A.M.N.H., 1; U.S.N.M., 6); Subia, Cundinamarca, 2 (A.M.N.H.); Paime, Río Minero, Cundinamarca, 1,038 meters, 4 (U.S.N.M.); Muzo, Río Minero, Boyacá, 2 (U.S.N.M.); La Candela, Huila, 6,500 feet, 2 (A.M.N.H.); Río Chili, Manizales, Caldas, 1 (U.S.N.M.); La Frijolera, Río Cauca, Antioquia, 5,000 feet, 2 (A.M.N.H.); Alto Bonito, Río Sucio, Antioquia, 1,500 feet, 3 (A.M.N.H.).

Family CALLITHRICHIDAE: Marmosets

The three species of Colombian marmosets found west of the Cordillera Oriental are confined to the northwestern part of the country. All are included in genus *Marikina*. So far as known, each species

occupies an exclusive range. *Marikina geoffroyi* occurs in the Choco and eastern Panamá, *M. oedipus* between the Río Atrato and the Río Cauca-Magdalena, and *M. leucopus* between the Ríos Cauca and Magdalena. Twenty-seven specimens of *M. leucopus* were taken by the author. Good series of the first two species mentioned were secured by Carriker in 1916 and 1918 and made available to the writer through the kindness of J. K. Doutt, of the Carnegie Museum.

ON THE CLASSIFICATION OF MARMOSETS

It is generally agreed that marmosets (exclusive of *Callimico* (if it is to be considered a marmoset)) are divisible into two principal groups. One group, characterized by incisiform lower canines, includes *Callithrix* (*Mico*) and *Cebuella;* the second group, with normal lower canine-incisor relationship, includes the remaining genera of Callithrichidae. There are several modern publications on the subject of characters and relationships of categories comprising the second group. Earliest of these is by Cabrera (1917b, pp. 31–32). After a brief and pithy critique of the nomenclature, he arranged a key under the generic heading of *Leontocebus* Wagner, translated as follows:

a. Upper lip without white mustache.

b. Pelage of head forming a long mane which nearly completely hides the ears.....subgenus **Leontocebus** *s. s.*
(Type by selection: *L. chrysomelas*)

b'. Pelage of head long but not forming a mane, the ears exposed.
subgenus **Tamarin** Gray
(Monotypic type: *L. ursulus*)

a'. Upper lip covered with white hairs forming a mustache.
subgenus **Mystax** Gray
(Type by tautonymy: *L. mystax*)

Bare-faced marmosets (*bicolor, oedipus,* etc.) were not discussed by Cabrera. In the same year, Pocock (1917, pp. 247–258), examined existing classifications of marmosets and described external characters of the principal groups. He recognized four genera of marmosets. After separating the dentally different *Hapale* (=*Callithrix*), Pocock distinguished *Leontocebus* from the two remaining genera by its elongated hand with webbing between the three middle fingers. *Oedipomidas* was separated from *Mystax* by the form of its ear, with lower posterior border of pinna emarginate or obsolete. *Seniocebus* was included in the synonymy of *Mystax.* In a later publication, Pocock (1920, pp. 91–113) repeated his observations on external characters of marmosets and compared them with those of Cebidae. He noted that the interdigital webbing in *Leontocebus* was also present, but to a lesser degree, in an individual of his genus *Mystax.* Thomas (1922, pp. 197–199) enlarged Pocock's classification by admitting the

bare-faced *Seniocebus* as a genus. His key to the genera *Leontocebus*, *Mystax*, *Seniocebus*, and *Oedipomidas* was based on length of fingers, size of ears, and color of tail and limbs. A list of the "species" of each genus was given. Tate (1939, pp. 207–209) discussed the nomenclature and replaced the preoccupied generic name *Mystax* with *Tamarin*. He combined *Seniocebus* with *Oedipomidas* as a subgenus of *Tamarin*. *Leontocebus* was retained as a full genus. Cruz Lima (1945, pp. 203–253) made use of the earlier name *Marikina* Lesson for the bare-faced marmosets heretofore included in *Oedipomidas* and *Seniocebus*. He also recognized the genera *Tamarin* and *Leontocebus*. No species were listed under the latter genus, but all Amazonian marmosets referable to *Tamarin* and *Marikina* were keyed and described, many of them figured in color.

It is apparent that subdivisions of marmosets with normal lower canine-incisor relationship include four recognizable species groups. At times these groups have been combined into one genus; at others, separated into genera. *Leontocebus* (*s. s.*), the least known and poorest represented in collections, has been most generally separated from the others. Its larger size and distinctive external and cranial characters justify its generic distinction. *Seniocebus* (=*Marikina s. s.*) has been combined at times with *Oedipomidas*; at others, with *Tamarin*. As long as diagnostic characters of each of these three categories are not found to be weightier, it is best to treat each as a subgenus of *Marikina*, the oldest available name. No consistent cranial characters distinguish any one subgenus of *Marikina* from another. Externally the bare-faced, large-eared *M.* (*Marikina*) is annectant between the equally large eared *M.* (*Tamarin*) and the bare-faced but small-eared *M.* (*Oedipomidas*).

The following key may aid in distinguishing *Leontocebus* from *Marikina* and the subgenera of the latter from one another:

I. Hand elongated, palm narrow, digits long; first phalanges of second and third fingers and third and fourth fingers closely united by webbing; length of longest finger (with claw) more than twice width of palm; head and sides of face completely covered, the long hairs forming a mane concealing ears; sphenoidal pits or vacuities large.....**Leontocebus** (p. 423)

II. Hands normal; palm broad, digits not markedly elongated; first phalanges of middle digits usually free, webbing, if present, extremely narrow; length of longest finger (with claw) less than twice width of palm; sides of crown and sides of face completely covered with hair or nearly bare; ears entirely or partially exposed. Sphenoidal pits or vacuities obsolete or absent.....**Marikina** (genus)

A. Side of head from brow to ear, cheeks, and chin covered with black, brown or reddish hairs [10]; arms, at least to wrists, black, brown, or red; tail, at least for terminal three-fourths, uniformly black or dark brown, with or without a grayish or rufous overlay; ears large.

Tamarin (subgenus, p. 411)

[10] For the white tamarin, see arrangement of species in subgenus *Tamarin*.

B. Side of head from brow to ear naked or sparsely haired white or brown; lower part of cheek, chin and upper part of throat nearly bare or sparsely haired; arms, hands and feet, above, whitish to ochraceous, never black; tail bicolor or with tip or terminal half contrasting with basal third.

1. Forehead and crown in front of ears naked or covered with short whitish or brown hairs; ears large, lamina of lower posterior margin of pinna complete, rounded and well developed---**Marikina** (*sensu stricto*, p. 418)

2. Forehead and crown adorned with a conspicuous median band or crest of long white hairs; ears small, lamina of lower posterior margin of pinna deeply emarginate or obsolete-------- **Oedipomidas** (subgenus, p. 414)

Classification of marmosets treated here places the most specialized genus *Leontocebus* last. Hairy-faced tamarins, subgenus *Tamarin*, of the genus *Marikina*, are most generalized as well as most diversified and widely distributed. They are listed first. The bare-faced tamarins, *Oedipomidas* (subgenus) and *Marikina* (sensu stricto), are nearly related but divergent branches of the common tamarin stock.

GENUS MARIKINA LESSON

(Synonymies under subgenera)

Subgenus TAMARIN Gray: Hairy-faced Tamarins

Tamarin GRAY, Catalogue of monkeys, lemurs and fruit-eating bats in the collection of the British Museum, p. 68, 1870 (subgenus of *Midas;* genotype, *Midas ursulus*, monotypic composite, restricted to *Midas ursulus* Geoffroy [=*Cebus tamarin* Link] by Palmer, Index Gen. Mamm., p. 660, 1904).

Cercopithecus GRONOV, Zoophylacium Gronovianum, fasc. 1, p. 5, 1763 (genotype, *Simia midas* Linnaeus, designated by Elliot, Bull. Amer. Mus. Nat. Hist., vol. 30, p. 341, 1911; generic name eliminated from consideration by suspension of Rules of Zoological Nomenclature, *cf.* opinion 89).

Midas HUMBOLDT, Recueil d'observations de zoologie et d'anatomie comparée, p. 361, 1812 (genotype, *Simia midas* Linnaeus, now designated; generic name preoccupied by *Midas* Latreille, 1796, a genus of Diptera).

Midas GEOFFROY, Ann. Mus. Hist. Nat., Paris, vol. 19, p. 120, 1812 (genotype, *rufimanus* Geoffroy, a species not included in Humboldt's original list; generic name antedated by *Midas* Humboldt and preoccupied by *Midas* Latreille).

Mystax GRAY, Catalogue of monkeys, lemurs and fruit-eating bats in the collection of the British Museum, p. 66, 1870 (subgenus of *Midas;* genotype, *mystax* Spix; generic name preoccupied by *Mystax* Stephens, 1829, a genus of Trichoptera).

Tamarinus TROUESSART, Cat. Mamm., Suppl., p. 29, 1899 (genotype, *mystax* Spix, designated by Pocock, Ann. Mag. Nat. Hist., ser. 8, vol. 20, p. 256, 1917).

Distribution.—Forested tropical zones of the Guianas, southern Venezuela, and the Amazonian regions of Brazil, Colombia, Ecuador, Peru, and Bolivia.

Included species.—The following arrangement is derived from original descriptions and colored figures and from the writer's notes on most of the types and many topotypes of named forms. Juvenal and aberrant characters are not taken into account in the key

characters. Accurate measurements of external and cranial characters useful in distinguishing the species are not available for most types, hence omitted from the key. Adjectives used as specific names are placed in the feminine when combined with *Marikina*.

I. Without white mustache or circumlabial band.

A. Hands and feet black---**Marikina (Tamarin) tamarin** Link (based on the *Tamarin nègre* of Buffon and Daubenton, 1789, suppl. vol. 7, p. 116, fig. 32. Type locality, district of Pará, determined by Wallace, Proc. Zool. Soc. London, 1852, p. 109). Synonym: *Saguinus ursula* Hoffmannsegg (Pará). Subspecies: *Marikina tamarin umbrata* Thomas (Cametá, Rio Tocantins, Pará).

B. Hands and feet yellow to orange---**Marikina midas** Linnaeus (French Guiana). Synonyms: *Callithrix Lacepede* Fischer, *Midas rufimanus* Geoffroy (Ipoussin, French Guiana), *Leontocebus midas egans* Thomas (Obidos, Rio Amazonas, Brazil).

II. With white mustache or circumlabial band.

A. White tamarins---**Marikina melanoleuca** Miranda Ribeiro[11] (Pará, Brazil). Synonym: *Leontocebus hololeucus* Pinto (Santo Antonio, Rio Eirú, upper Rio Juruá).

B. Long-whiskered or emperor tamarins. White moustache extremely developed and extending to shoulders when laid back, tail dominantly rufous---**Marikina imperator imperator** Goeldi (Rio Acre and upper Rio Purús region, western Brazil); **Marikina imperator subgrisescens** Lönnberg (Santo Antonio, Rio Eirú, upper Juruá, southwestern Amazonas, Brazil).

C. Black-mantled tamarins. Terminal halves of hairs from nape to shoulders and of upper arms, blackish with or without fine buffy ticking.

1. Outer sides of hind limbs, except feet, not markedly different from middle of back.

a. Crown not entirely red.

(*1*). With a well-developed rufous or whitish patch on black crown; upperparts of body blackish with thighs and posterior part of back marbled; underparts sharply defined rufous---**Marikina labiata** Humboldt, Brazil (*Midas labiatus* E. Geoffroy, antedated). Synonyms: *Jacchus rufiventer* Gray ("Mexico"=*Midas rufoventer* [sic] Gray, Proc. Zool. Soc. London, 1865, p. 735, Brazil), *Midas elegantulus* Slack (Amazonian region), *Midas erythrogaster* Reichenbach (=*Hapale erythrogaster* Pelzeln, *nomen nudum*, Lago do Joanacan, Rio Solimões), *Midas thomasi* Goeldi (Tonantins, Solimões, western Brazil), *Midas griseovertex* Goeldi (Upper Purús and Acre regions, western Brazil).

(*2*). Without contrasting patch of white or rufous on black crown.

(*a*). Back marbled black and rufous, inguinal and anal regions not surrounded by wholly white hairs; basal halves of hairs of nape, upper arms and lateral fringe sharply defined whitish; white narial patches meeting at midline above nostrils---**Marikina mystax** Spix (between the Solimões and Içá, western Brazil).

(*b*). Back marbled black and gray or buff; inguinal and anal regions

[11] Cotype from Pará examined by Thomas (Ann. Mag. Nat. Hist., ser. 9, vol. 6, p. 269, 1920) and determined as a true tamarin (*ibid.*, vol. 9, p. 199, 1922). Four topotypes of *hololeuca* in the collection of the Chicago Natural History Museum are true tamarins and agree with the description of *melanoleuca*. Cruz Lima (1945) regarded both as conspecific but referred them to *Callithrix*.

with wholly white hairs; pale basal portions of hairs of nape, upper arms and lateral fringe not sharply defined from terminal portions; white narial patches meeting at midline above nostrils. **Marikina pluto** Lönnberg (Ayapuá, Rio Purús, western Brazil).

(*c*). Back evenly ticked golden and black; basal portions of hairs of nape, etc., brown; white narial patches not meeting at midline above nostrils---**Marikina graellsi** Jiménez de la Espada (Destacamento, Río Napo, near confluence with Marañón, Loreto, Peru).

b. Crown and forehead sharply defined red---**Marikina pileata pileata** Geoffroy (near Pebas, Loreto, Peru); **Marikina pileata juruana** Ihering (middle Rio Juruá, southwestern Amazonas, Brazil).

2. Outer sides of hind limbs, except feet, rufous, tawny, or red, in marked contrast with black or marbled midportion of back; tail black, feet dark.

a. Terminal halves of hairs of forehead and crown between ears broadly banded buffy or rufous---**Marikina fuscicollis** Spix (São Paulo de Olivença, between Solimões and Içá, western Brazil). Synonyms: *Midas flavifrons* Geoffroy (Pebas, Loreto, Peru), *Hapale nigrifrons* Geoffroy (unknown locality), *Mystax nigrifrons pebilis* Thomas (Pebas, Loreto, Peru).

b. Terminal halves of hairs of upperpart of forehead and crown black.

(*1*). With broad whitish transverse frontal band sharply defined from dark superciliary region; posterior half of back marbled or striated black and buff to rufous---**Marikina weddelli** Deville (Apolobamba, Bolivia). Synonyms: *Leontocebus purillus* Thomas (Rio Xapury, upper Rio Purús, western Brazil). *Mystax imberbis* Lönnberg (Victoria, confluence of Ríos Madre de Dios and Beni, Bolivia).

(*2*). Without contrasting whitish band across black forehead.

(*a*). Basal portions of hairs of nape, shoulders and upper arms white. **Marikina mystax** Spix (between the Solimões and Içá, western Brazil).

(*b*). Basal portions of hairs of nape, shoulders, and upper arms black or dark brown---**Marikina nigricollis** Spix (north bank Río Solimões near São Paulo de Olivença, western Brazil). Synonyms: *Midas rufoniger* Geoffroy and Deville (Pebas, Loreto, Peru), *Hapale devilli* Geoffroy (Sacayacu, Loreto, Peru), *Midas leucogenys* Gray (Brazil), *Leontocebus pacator* Thomas (Río Pachitea, Peru), *Mystax devillei micans* Thomas (Yurac Yacu, San Martín, Peru).

D. Red-mantled tamarins. Terminal halves of hairs (except, sometimes, fine black tips) from nape to shoulders, and of outer sides of limbs except hands and feet, tawny or reddish in marked contrast with black crown, tail, and marbled middle portion of back---**Marikina illigeri** Pucheran (believed to be Colombia, here restricted to the Colombian bank of the Solimões). Synonyms: *Midas lagonotus* Jiménez de Espada (Destacamento, Río Napo near confluence with Marañon, Loreto, Peru), *Midas tripartitus* Milne Edwards (Río Napo, Ecuador), *Mystax bluntschlii* Matschie (Río Saimiri, affluent of the Marañón, Loreto, Peru), *Midas apiculatus* Thomas (Río Copataza, upper Pastaza, eastern Ecuador), *Leontocebus mounseyi* Thomas, (Río Pacaya, opposite Sapote, lower Ucayali, Peru).

Subgenus OEDIPOMIDAS Reichenbach: Titis, or Crested Bare-faced Tamarins

Oedipomidas REICHENBACH, Die vollständigste Naturgeschichte der Affen, p. 5, 1862 (new name for *Œdipus* Lesson, preoccupied; genotype, *Simia oedipus* Linnaeus, designation by Elliot, A review of the Primates, vol. 1, p. 213, 1913).

Œdipus Lesson, Species des mammifères, bimanes et quadrumanes suivi d'un mémoire sur les Oryctéropes, pp. 184, 197, 1840 (subgenus of *Midas;* generic name preoccupied by *Œdipus* Tschudi, a genus of Amphibia; genotype, *Œdipus titi*, a monotypic composite restricted by elimination to *Oedipomidas oedipus* [=*Simia oedipus* Linnaeus] by Reichenbach, 1862).

Hapanella GRAY, Catalogue of monkeys, lemurs and fruit-eating bats in the collection of the British Museum, p. 65, 1870 (subgenus of *Œdipus;* genotype, *Œdipus Geoffroyi* by monotypy).

Distribution (map, fig. 59).—Eastern Panamá and coast of northern Colombia west of the Río Magdalena.

Included species.—The two species of subgenus *Oedipomidas* are arranged in the following key:

1. Head dress continued behind ears and over nape as a flowing white mane; greatest width across pinna (dry) 13–15 mm.
   M. (Oedipomidas) oedipus (p. 414)
2. Head dress white in front, sharply contrasted reddish on back of head and nape; greatest width across pinna (dry) 14–18 mm.
   M. (Oedipomidas) geoffroyi (p. 416)

MARIKINA OEDIPUS Linnaeus

Simia Oedipus LINNAEUS, Systema naturae, ed. 10, vol. 1, p. 28, 1758.

Simia [Midas] Oedipus, HUMBOLDT, Recueil d'observations de zoologie et d'anatomie comparée, pp. 8, 332, 337–340, 361, pl. 3, figs. 1–2, 1805–1812 (description; habits; anatomy of larynx; distribution: Cartagena; Turbaco; Darién; mouth of Río Sinú).

Œdipus titi LESSON, Species des mammifères, bimanes et quadrumanes suivi d'un mémoire sur les Oryctéropes, p. 197, 1840 (part; the *adulte* only; description; synonymy).

Seniocebus meticulosus ELLIOT, Bull. Amer. Mus. Nat. Hist., vol. 31, p. 31, 1912 (type locality, Río San Jorge, Bolívar, Colombia); A review of the Primates, vol. 1, p. 188, frontispiece (colored plate), photographic pl. 22 (skull), 1913.

C[allithrix] Sciurea [sic], SCHOTT (*nec* Linnaeus), Exec. Doc. vol. 7, No. 9, 36th Congress, 2d Session, Appendix E, Zool., p. 213, 1861 (Isthmus of Darién; tame individual secured from natives).

Œdipomidas œdipus. ELLIOT, A review of the Primates, vol. 1, p. 213, pl. 26, 1913; Bull. Amer. Mus. Nat. Hist., vol. 33, p. 644, 1914 (*meticulosus* Elliot in synonymy).—ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 35, p. 228, 1916 (Río San Jorge).

Oe[dipomidas] Oedipus, REICHENBACH, Die vollständigste Naturgeschichte der Affen, p. 5, figs. 18–20, 1862 (synonymy, including *Œaipus titi* Lesson).

Leontopithecus œdipus, THOMAS, Proc. Zool. Soc. London, 1911, p. 127.

Type.—None preserved. Name based on description and colored plate of Edwards' "little lion-monkey" (see below).

Type locality.—"America." Linnaeus described *oedipus* as "*Cerco-*

pithecus minimus mexicanus" and cited Edwards, Aves, iv, p. 195, pl. 195, 1751, as sole basis. According to Edwards, the original specimen was said to have been brought from "La Vera Cruz in New Spain [=México]." The species does not occur naturally outside of Colombia. The true habitat of the species was first determined by Humboldt (*op. cit. supra*). The data given by Humboldt plus present material permit restriction of type locality to the lower Río Sinú, department of Bolívar, Colombia.

Distribution.—Northern Colombia, from Golfo de Darién, Antioquia, east to Río San Jorge, department of Bolívar, thence north between the coast and the west bank of the Río Magdalena as far as Cartagena and at least the southern portion of department of Atlántico. The species may also occur in the area between the Río San Jorge and the Cauca.

Coloration.—Front of face sparsely haired, gray superciliary band well defined; chin, sides of forehead, neck, and face bare except for a fine whitish line from posterior corner of eye to angle of jaw. White headdress pointed in front, the long hairs flowing behind over nape to interscapular region. Back Fuscous to Drab grizzled with buffy or striated with buffy and Mars Orange; rump and outer surface of thigh like back or nearly uniformly Mars Orange or Burnt Sienna. Leg, arm, upper side of hand and foot and ventral surface of body white, yellow, or ochraceous. Proximal one-third to one-fourth of tail Mars Orange to Burnt Sienna, distally paler and mixed with dark brown or black, terminal one-half dark brown or black.

Measurements.—Those of three males from Jaraquiel, Río Sinú followed by those of a female skull from Río San Jorge: Head and body, 224, 226, 245; tail, 380, 380, 382; hind foot, 72, 73, 70; greatest length of skull, 49.4, 50.4, 51.5, 50.1; zygomatic breadth, 31.9, 30.9, 32.6, 34.0; distance across orbital rings, 26.2, 26.4, 26.8, 28.5; width of brain case, 26.0, 26.1, 26.8, 27.7; distance across auditory bullae from meatus, 23.7, 23.5, 24.4, 23.4; crown length of upper molar row, 9.6, 9.6, 9.3, 9.0; crown width of first upper molar, 3.2, 3.3, 3.1, 3.3 mm.

Remarks.—There is no evidence that the range of *Marikina oedipus* overlaps that of *M. leucopus* to the east and that of *M. geoffroyi* to the west. It can be stated categorically that *oedipus* does not naturally occur east of the Río Magdalena in the department of Magdalena. It is possible, however, that the range extends west as far as the Río Atrato but certainly not beyond. No marmosets were seen by the writer during his short stay in the Ciénaga de Guájaro region, between Barranquilla and Cartagena, but *M. oedipus* is well known by natives there and is said to be common. Humboldt recorded the *titi* from Cartagena and the canal de Mahates, both localities a short distance southwest of the Ciénaga de Guájaro.

The vernacular name for marmosets in Colombia and Panamá is *titi*. The vernacular name *pinche* for *M. oedipus* was adopted by Buffon from an account by La Condamine of an entirely different monkey found living in Maynas, northeastern Peru. *M. oedipus* was first described and figured by Edwards (A Natural History of Birds, part 4, p. 195, pl. 195, 1751) as "the little lion-monkey from La Vera Cruz in New Spain." The specimen was alive and in the possession of the Countess of Suffolk. Brisson (1756, p. 210) described under the name "le petit singe du Mexique" another individual of *M. oedipus* brought from Mexico by Pére Bernard Cordelier. On the other hand, Brisson (*op. cit.*, p. 200) applied the name "le petit singe-lion" to a living specimen of *Leontocebus rosalia* sent from Brazil in 1754 and owned by Madame Pompadour.

Specimens examined.—Sixteen. Jaraquiel, Río Sinú, Bolívar, 6 (C.M.); San Jorge, Bolívar, 1 (A.M.N.H.); "Isthmus of Darién," Antioquia, 1 (U.S.N.M.); no locality, menagerie and pet-shop specimens, 8 (U.S.N.M.).

MARIKINA GEOFFROYI Pucheran

Midas Œdipus (varietas), Spix (*nec* Linnaeus), Simiarum et vespertilionum Brasiliensium, species novae, p. 30, pl. 23, 1823 ("*habitat, ut opinor, in provincia Guiana*").

Hapale Geoffroyi Pucheran, Rev. Mag. Zool., Paris, vol. 8, p. 336, 1845.

Œdipus titi Lesson, Species des mammifères, bimanes et quadrumanes suivi d'un mémoire sur les Oryctéropes, p. 199, 1840 (part; *jeune adulte*=*Midas Œdipus* var. Spix, the example described, not *Œdipus titi* Lesson=*Marikina œdipus* Linnaeus, by restriction).

J[*acchus*] *Spixii* Reichenbach, Die vollständigste Naturgeschichte der Affen, p. 1, pl. 1, fig. 2, 1862 (based on *Midas Œdipus* var. Spix, the figure given being a modification of the original *ex* Spix).

Oedipomidas salaquiensis Elliot, Bull. Amer. Mus. Nat. Hist., vol. 31, p. 137, 1912 (type locality, Río Salaquí, Chocó, Colombia).

Midas Geoffroyi, Geoffroy, Arch. Mus. Hist. Nat., Paris, vol. 5, p. 579, 1845 (description; Panamá).

Midas geoffroyi, Sclater, Proc. Zool. Soc. London, 1871, p. 478, pl. 38 (Panamá; Colombia, near coast).—Sclater, Proc. Zool. Soc. London, 1872, p. 8 (Panamá).—Alston, Biologia Centrali-Americana, Mammalia, p. 17, 1882 (Panamá: Colón; Chepo; Chiriquí [!]; Colombia).

Oe[*dipomidas*] *geoffroyi*, Reichenbach, Die vollständigste Naturgeschichte der Affen, p. 5, 1862.

Oedipomidas geoffroyi, Elliot, A review of the Primates, vol. 1, p. 214, 1913; Bull. Amer. Mus. Nat. Hist., vol. 33, p. 644, 1914 (synonymy including *salaquiensis* Elliot).—Allen, Bull. Amer. Mus. Nat. Hist., vol. 35, p. 227, 1916 (Colombia: Río Salaquí, Chocó; Baudo, Chocó).

Leontocebus geoffroyi, Anthony, Bull. Amer. Mus. Nat. Hist., vol. 35, p. 374, 1916 (Boca de Cupe; Chepigana; Cituro; Maxon Ranch (Río Trinidad); Tacarcuna; Tapalisa).—Goldman, Smithsonian Misc. Coll., vol. 69, p. 226, 1920 (Cana; Chepo; Río Indio, near Gatun).—Allen and Barbour, Bull. Mus. Comp. Zool., vol. 65, p. 273, 1923 (Panamá: Río Esnape; Río Jesusito).

Oedipomidas spixi [sic], Cabrera, Ciencia, Rev. hispano-americana cienc. puras

y aplic., México, vol. 1, p. 403, 1940 (substitute name for *Hapale geoffroyi* Pucheran, "preoccupied" by *Simia geoffroyi* Humboldt).

Holotype.—Female, skin mounted, skull separate, M. N. H. N. type catalog No. 112, accession catalog No. 621; the living specimen donated to the menagerie of the Jardin des Plantes, Paris, died August 25, 1845.

Type locality.—"Panama," here restricted to Canal Zone.

Distribution.—From the Chocó, Pacific coast of Colombia, north into Canal Zone, Panamá; altitudinal range, sea level to approximately 700 meters above in the Serranía del Darién.

Coloration.—Face sparsely haired but with a well-defined line of whitish hairs from posterior corner of eye to angle of jaw; grayish superciliary band moderately well defined; median frontal region with a triangular crest of coarse white hairs; sides of crown sparsely haired. Hairs of reddish mantle from back of head to interscapular region black basally, Orange-Rufous to Mahogany Red terminally. Back and sides marbled or irregularly striated with black and buffy to ochraceous or white, the hairs black basally, white or Light Buff to Ochraceous-Buff, subterminally, tips black; outer surface of thigh like back, inner side often like basal portion of tail; outer surface of leg with less black than thigh, foot whitish to yellow or ochraceous on upper surface. Upper surface of shoulder, arm and hand, inner surface of limbs, neck (except nape), throat, chest and belly, white to yellow, the chest and belly often streaked with ochraceous; hairs at angle between chin and throat directed forward. Proximal one-fifth to one-third of tail mixed or striated black and Orange-Rufous to Mahogany Red, terminal portion uniformly black.

Measurements.—Those of a male and female from Sautatá, Río Atrato, followed by those (cranial only) of a male from Río Salaquí, Chocó, both localities in Colombia: head and body, 245, 250; tail, 382, 370; hind foot, 73, 72; greatest length of skull, 52.5, 51.2, 54.0; zygomatic breadth, 36.3, 35.4, 36.2; distance across orbital rings, 29.5, 28.5, 29.5; width of brain case, 28.0, 28.4, 27.6; distance across auditory bullae from meatus, 25.7, 25.5, 25.9; crown length of upper molar row, 9.8, 10.4, 10.0; crown width of upper first molar, 3.7, 3.4, 3.7 mm.

Remarks.—*Marikina geoffroyi* is the only marmoset indigenous to North America. Biogeographically, however, the Panamanian part of the range enters into the composition of the "Chocó-Darién" subzone of continental South America. Besides Panamá, Elliot erroneously included Costa Rica, instead of Colombia, in the range of *geoffroyi*.

According to Cabrera's (*op. cit.*) interpretation of the Rules regarding homonyms, *Hapale geoffroyi* Pucheran is preoccupied by *Simia*

geoffroyi Humboldt, a *Callithrix*, simply because Humboldt's *geoffroyi* had been transferred to the genus *Hapale* Illiger by Kuhl (Beiträge Zool., Abth. 1, p. 47, 1820). As in the case of *Cebus leucocephalus* Gray (*cf.*, p. 344), such application of the Rules regarding primary homonyms to secondarily created homonyms is rejected. Pending clarification by the International Commission on Zoological Nomenclature, a "secondary homonym" is recognized here as equivalent to a true homonym only for the time it remains in the genus that automatically fixes its status as such. *Hapale geoffroyi* Pucheran is patently no primary homonym of *Simia geoffroyi* Humboldt. That Pucheran erroneously assigned his *geoffroyi* to the invalidated genus *Hapale* does not alter the fact that his and Humboldt's *geoffroyi* are not and never were simultaneously congeneric and, therefore, are not and never were secondarily homonymous. Unfortunately, the abused concept, not a rule, "once a homonym always a homonym" is subject to such interpretation that all technical names can lose stability by any manipulation of scientific terminology. Thus, present Rules do not prevent an author from referring all species of Primates to one genus and renaming all "secondary homonyms" thus created.

Marikina geoffroyi, along with all other Colombian species of marmosets, is known locally by the name *tití*. Allen and Barbour observed that in Panamá *M. geoffroyi* is "called 'Tití' by Spanish speakers and 'Bichichí' by Indians." This last name is applied also to *Saimiri sciureus* by the Indians of Maipures, Río Orinoco (*fide* Humboldt, Recueil, p. 333, who spells the name in French phonetic, "*Bitschetschi*").

Specimens examined.—Thirty-one. PANAMÁ: La Chorrera, 1 (U.S.N.M.); Agua Blanca, Canal Zone, 1 (U.S.N.M.); Alajuela, Canal Zone, 3 (U.S.N.M.); Las Cascades, Canal Zone, 1 (U.S.N.M.); Río Indio, near Gatun, Canal Zone, 8 (U.S.N.M.); Cana, Panamá, 2 (U.S.N.M.); Chepo, Panamá, 1 (U.S.N.M.); no precise locality, 5 (M.N.H.N., type of *geoffroyi* Pucheran; U.S.N.M., 4). COLOMBIA: Sautatá, Río Atrato, Chocó, 7 (C.M.); Río Salaquí, Chocó, 1 (A.M.N.H.); Baudo, Chocó, 1 (A.M.N.H.).

Subgenus MARIKINA Lesson: True Bare-faced Tamarins

Marikina LESSON, Species des mammifères, bimanes et quadrumanes suivi d'un mémoire sur les Oryctéropes, p. 199, 1840 (listed under synonymy of *Œdipus titi* Lesson [=*Simia oedipus* Linnaeus, see under *Oedipomidas* above] in an erroneous combination with [*Midas*] *bicolor* Spix and the bibliographic references thereto; genotype, *Marikina bicolor*, Lesson [=*Midas bicolor* Spix].—CRUZ LIMA, Contr. Mus. Paraense Emilio Goeldi Hist. Nat., English ed., vol. 1, p. 203, 1945.

Seniocebus GRAY, Catalogue of monkeys, lemurs and fruit-eating bats in the collection of the British Museum, p. 68, 1870 (genotype, *Seniocebus bicolor* [=*Midas bicolor* Spix], by monotypy).

Distribution (map, fig. 59).—North bank of Rio Amazonas from

Obidos, Pará, Brazil, west perhaps to Pebas in Loreto, Peru; and in Colombia, between the Ríos Magdalena and Cauca in departments of Bolívar and Antioquia.

Included species.—The three species of the subgenus *Marikina* are arranged in the following key:

1. Chest white, sharply contrasted with orange or reddish of belly; greatest width across pinna (dry), approximately 23.5–24.5 mm.
M. (Marikina) bicolor (p. 421)
2. Chest yellow to reddish, not markedly different from belly.
   a. Tail sharply bicolor, dark brown above, orange beneath; chin naked or nearly so; hairs of throat directed backward, not forming a whorl; greatest width across pinna (dry), 21–24 mm---**M. (Marikina) martinsi** (p. 422)
   b. Tail with upper side not markedly different from lower; chin well covered, the hairs extending from whorl of throat and directed forward; greatest width across pinna (dry), 19–24 mm----**M. (Marikina) leucopus** (p. 419)

MARIKINA LEUCOPUS Günther

Hapale leucopus Günther, Proc. Zool. Soc. London, 1876, p. 743, pl. 72.

Callithrix leucopus, Elliot, A review of the Primates, vol. 1, p. 222, 1913 (description; measurements; selection of lectotype).

Seniocebus pegasis Elliot, Bull. Amer. Mus. Nat. Hist., vol. 32, p. 252, 1913 (type locality, Puerto Berrío, Río Magdalena, Antoquia, Colombia).

Oedipomidas leucopus, Elliot, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 645, 1914 (synonymy including *pegasis* Elliot).—Allen, Bull. Amer. Mus. Nat. Hist., vol. 35, p. 228, 1916 (Puerto Berrío; Malena, west of Puerto Berrío; Puerto Valdivia, Río Cauca).

Lectotype.—Skin and skull, British Museum (Natural History) No. 75.6.3.1; collected by T. K. Salmon.

Type locality.—Near Medellín, Antioquia, Colombia.

Distribution.—In Colombia from confluence of Ríos Magdalena and Cauca, department of Bolívar, north into department of Antioquia; altitudinal range from near sea level to approximately 1,000 meters above. The species does not occur naturally east of the Río Magdalena and west of the Río Cauca.

Coloration.—Front of face from lips to eyes sparsely covered with minute whitish hairs, chin with ochraceous to brownish hairs, cheek with long silvery hairs; forehead and crown to front of ears well covered with short silvery hairs converging to form a fine median frontal line; back of head between ears and nape like back but with pale lining reduced or absent. Hairs of back and sides Fuscous, Hair Brown, or Drab with terminal portions often silvery, or yellowish to Ochraceous-Buff, forming a lining through which brownish basal portions are visible. Hairs of chest, belly, and inner side of limbs Drab basally, Orange-Rufous to Mahogany Red terminally; nearly uniformly Drab hairs of throat forming a whorl. Outer side of arm, hand, leg and foot above white to Ochraceous-Buff, a brownish patch on ankle and metatarsus; thigh on outer side grading from color of back to that of leg. Tail brownish thinly lined with silvery to ochraceous, penciled tip uniformly silvery to ochraceous.

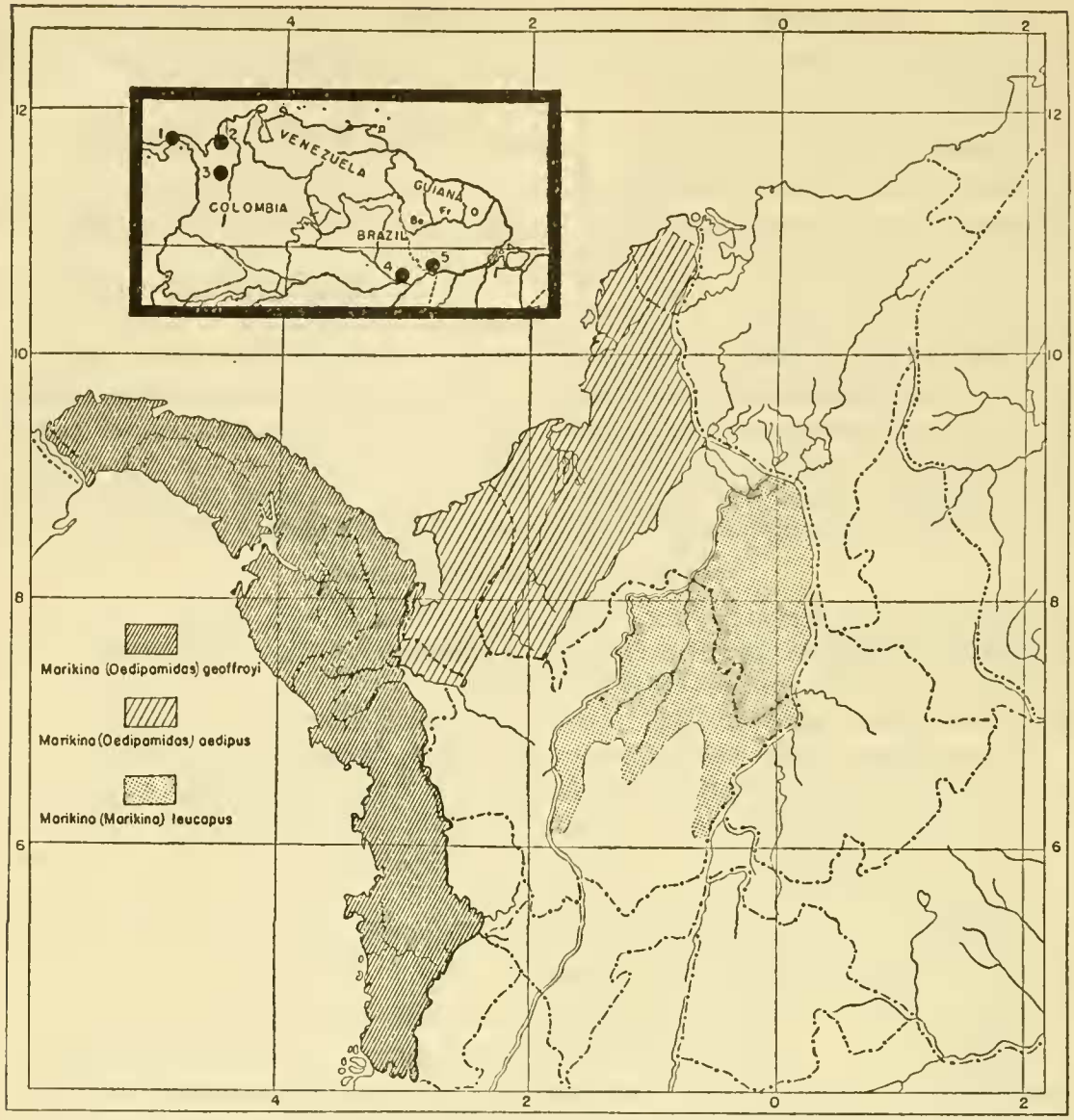

FIGURE 59.—Distribution of tamarins, genus *Marikina*, found in Colombia and Panamá. Inset, type localities of bare-faced tamarins: 1, *Marikina* (*Oedipomidas*) *geoffroyi*; 2, *Marikina* (*Oedipomidas*) *oedipus*; 3, *Marikina* (*Marikina*) *leucopus*; 4, *Marikina* (*Marikina*) *bicolor*; 5, *Marikina* (*Marikina*) *martinsi*.

Measurements.—Means and extremes of 25 adults (11 males and 14 females, all from Norosí, Bolívar): Head and body, 243 (224–283) tail, 383 (341–417); hind foot (with claw), 74 (66–80); ear (from notch), 27 (24–30); greatest length of skull, 50.6 (46.4–53.3); zygomatic breadth, 33.9 (31.6–36.0); across orbital rings, 27.7 (26.1–29.2); width of brain case, 27.9 (27.1–29.2); distance across auditory bullae from meatus, 22.7 (21.8–23.7); crown length of upper molar row, 9.7 (9.0–10.3): crown width of upper first molar, 3.3 (3.1–3.4) mm.

Remarks.—There are no apparent differences between sexes. Juvenals and adults show the same range of variation in color. Superficially, *leucopus* resembles *martinsi* in color of nape and back. The tail of *martinsi*, however, is sharply bicolor, limbs more ochraceous, ventral surface of body more yellow, less red. Skull of *leucopus* is

nearly brachycephalic, that of *martinsi* decidedly dolichocephalic. Altogether *leucopus* is smaller.

Three specimens of *leucopus* labeled as being from Puerto Estrella, right bank of Río Magdalena, and collected by H. M. Curran, must have been taken on the left bank of the river. The species does not naturally occur anywhere on the right bank of the Magdalena though it is abundant along the wooded edge of the left bank. M. A. Carriker, Jr. (*in epist.*), reports the occurrence of *leucopus* above Simití, Cordillera Central, altitude 3,200 feet. No other species of marmoset inhabits any part of the range of *M. leucopus*. There is an immense geographic hiatus between *leucopus* and its nearest relatives, *martinsi* and *bicolor*, both of the Amazonian region. Local name of *M. leucopus* is *titi*.

Specimens examined.—Thirty-four. Medellín, Antioquia, lectotype and cotype (B. M. N. H.); Puerto Valdivia, Antioquia, 1 (A.M.N.H.); Malena, west of Puerto Berrío, Antioquia, 1 (A.M.N.H.); Puerto Estrella, Río Magdalena, 3 (U.S.N.M.); Norosí, Bolívar, 20 (U.S.N.M.); Río San Pedro, Norosí, 7 (U.S.N.M.).

MARIKINA BICOLOR Spix

Midas bicolor Spix, Simiarum et vespertilionum Brasiliensium, species novae, p. 30, pl. 24, fig. 1, 1823.—Pelzeln, Verh. zool.-bot. Ges. Wien, vol. 33, 1883, p. 25, 1884 (Barra do Rio Negro).—Goeldi and Hagmann, Bol. Mus. Goeldi (Paraense), vol. 4, p. 53, 1906 (Brazil).

M[idas] bicolor, Geoffroy, Animaux nouveaux ou rares recueillis pendant l'expédition dans les parties centrales de l'Amérique du Sud, mammifères, p. 21, 1855 (Pebas, Loreto, Peru).

Hapale bicolor, Wagner, Abh. math.-phys. Cl. bayer. Akad. Wiss. München, vol. 5, Abt. 2, p. 473, 1848 (Barra do Rio Negro).

Œdipus titi Lesson, Species des mammifères, bimanes et quadrumanes suivi d'un mémoire sur les Oryctéropes, p. 199, 1840 (part; *age non adulte* only, with "*Marikina*" *bicolor* Spix described as the example).

Jacchus bicolor, Wallace, Proc. Zool. Soc. London, 1852, pp. 107, 109, 110 ("Guiana side of the Rio Negro near the city of Barra").

Seniocebus bicolor, Gray, Catalogue of monkeys, lemurs, and fruit-eating bats in the collection of the British Museum, p. 68, 1870.—Lönnberg, Arkiv Zool., Stockholm, vol. 32, no. 10, p. 15, 1940 (Manáos; measurements).

Tamarin (Oedipomidas) bicolor, Tate, Bull. Amer. Mus. Nat. Hist., vol. 76, p. 208, 1939 (Manáos).

Marikina bicolor, Cruz Lima, Contr. Mus. Paraense Emilio Goeldi Hist. Nat., vol. 1, p. 205, pl. 33, fig. 1, 1945 (Flores, suburb of Manáos; description).

Type.—In Zoologische Staatssammlung, Munich.

Type locality.—"Wooded plains near the village of Rio Negro," (=Manáos), Amazonas, Brazil.

Distribution.—Known from vicinity of Manáos, east bank of Rio Negro, near its junction with the Amazon; also recorded by Geoffroy (*op. cit.*) from Pebas, north bank of the Amazon, below embouchure of Río Napo, Peru.

Coloration.—Chin to crown in front of ears nearly bare; back of head, nape, interscapular region with long white hairs, the white extending from shoulders over arms, throat, and chest and tapering to a point on anterior half of belly. Remainder of back and sides sharply contrasted Fuscous to Drab lined or grizzled with buffy to ochraceous, a poorly defined dark median band present or absent; outer surface of thigh and leg like back. Belly and inner surface of thigh Ochraceous-Orange to Orange-Rufous. Outer surface of fore limb white or yellowish, hand above silvery more or less lined with buffy or ochraceous. Tail above dark brown to black, penciled tip black, or like sharply defined orange underside of tail.

Measurements.—Of an adult female topotype: Head and body, 229; tail, 335, kind foot, 70; greatest length of skull 49.9; zygomatic breadth, 33.2; distance across orbital rings, 28.0; width of brain case, 27.4; distance across auditory bullae from meatus, 23.5; crown length of upper molar row, 9.6; crown width of first upper molar, 3.5 mm.

Remarks.—Tip of tail of an old female is black on upper side, that of the only other available specimen, an immature male, orange. The original color plate of *bicolor* shows the tail entirely orange except for paler basal portion and slightly darker tip.

Specimens examined.—Two. Manáos, 1 (C.N.H.M.); Campos Salles, Manáos, Rio Negro, Brazil, 1 (A.M.N.H.).

MARIKINA MARTINSI Thomas

Leontocebus martinsi Thomas, Ann. Mag. Nat. Hist., ser. 8, vol. 9, p. 85, 1912.

Seniocebus martinsi, Elliot, A review of the Primates, vol. 1, p. 189, 1913 (description quoted).

Oedipomidas martinsi, Elliot, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 645, 1914 (synonymy).

Tamarin (Oedipomidas) martinsi, Tate, Bull. Amer. Mus. Nat. Hist., vol. 76, p. 209, 1939 (Faro, Brazil).

Marikina martinsi, Cruz Lima, Contrib. Mus. Paraense Emilio Goeldi Hist. Nat., vol. 1, p. 205, pl. 33, fig. 2, 1945 (Faro; Rio Erepecurú, Pará, Brazil).

Holotype.—Adult male, skin and skull, British Museum (Natural History) No. 11. 12. 22. 2; collected April 27, 1911, by Oscar Martins; original number, 3.

Type locality.—Faro, north side of lower Amazonas, near mouth of Rio Yamundá, western Pará, Brazil.

Distribution.—Known only from the small area on north bank of lower Amazonas between Rios Yamandú (Faro), and Erepecurú (Obidos), state of Pará, Brazil.

Coloration.—Chin to crown in front of ears nearly bare; crown between ears sparsely covered with long Drab hairs. Nape, back, and sides Drab to Hair Brown lined with Light Buff to Ochraceous-Buff, brownish basal portions of hairs showing through, nape sometime without ochraceous lining. Fore limb Warm Buff to Antimony Yellow on outer side, more ochraceous on inner; outer side of hind

limb like side of back but more uniformly ochraceous, inner side Ochraceous-Orange; upper surface of hand and foot yellowish or ochraceous. Throat, chest, and belly Ochraceous-Buff to Ochraceous-Orange. Upper surface of tail dark brown, penciled tip and underside sharply defined Ochraceous-Buff to Ochraceous-Orange.

Measurements.—Those of one adult male and three adult female topotypes respectively: Head and body, 219, 240, 245, 250; tail, 349, 420, 400, 410; hind foot, 66, 74, 79, 83; greatest length of skull, 50.5, 52.0, 52.4, 54.1; zygomatic breadth, 35.9, 34.9, 35.1, 36.2; distance across orbital rings, 28.5, 28.3, 27.9, 29.0; width of brain case, 26.2, 27.3, 27.6, 27.1; distance across auditory bullae from meatus, 23.2, 23.3, 24.3, 25.5, crown length of upper molar row, 9.9, 10.3, 10.5, 10.2; crown width of first upper molar, 3.2, 3.5, 3.4, 3.3 mm.

Specimens examined.—Eight. Type (B.M.N.H); Rio Yamundá, Faro, 1 (C.N.H.M.); Rio Piratucú, Faro, 5 (A.M.N.H.); Serra do Espelho, Faro, 1 (A.M.N.H.).

GENUS LEONTOCEBUS WAGNER: LITTLE LION-MONKEYS

Leontocebus Wagner, Die Säugthiere in Abbildungen nach der Natur, Supplementband, vol. 1, Uebersicht pp. ix, v (*bis*), 1840 [1839] (subgenus of *Hapale*; genotype, *Midas leoninus* Geoffroy [= *Simia leonina* Humboldt preoccupied by *Simia leonina* Shaw, 1800, replaced by *Leontopithecus fuscus* Lesson= *Simia rosalia* Linneaus], designated by Miller, U. S. Nat. Mus. Bull. 79, p. 380, 1912, antedates genotypic designation of *Hapale chrysomelas* Weid [=*Midas chrysomelas* Kuhl] by Elliot, A review of the Primates, vol. 1, p. 194, 1913).

Leontopithecus Lesson, Species des mammifères, bimanes et quadrumanes suivi d'un mémoire sur les Oryctéropes, p. 184, 1840 (subgenus of *Midas;* included species: *marikina* [=*Simia rosalia* Linnaeus], *fuscus* [=*Simia leonina* Humboldt, *nec* Shaw], *ater* [=*Jacchus chrysopygus* Mikan] *ater* var. A and *ater* var. B [=*Midas chrysomelas* Kuhl]; genotype, *Simia leonina* Humboldt, [=*Simia rosalia* Linnaeus] monotypic designation by first reviser Reichenbach, Die vollständigste Naturgeschichte der Affen, p. 6, 1862, antedates genotypic designation, *L. marikina* Lesson=*Simia rosalia* Linnaeus, by Pocock, 1917.

Marikina Reichenbach (*nec* Lesson), Die vollständigste Naturgeschichte der Affen, p. 7, 1862 (included species: *rosalia, chrysomelas, albifrons, chrysopygus;* genotype, *Simia rosalia* Linnaeus, designated by Pocock, Ann. Mag. Nat. Hist., ser. 8, vol. 20, p. 255, 1917).

Distribution.—Eastern Brazil.

Included species.—The three species recognized are *Leontocebus rosalia* Linnaeus of coastal southeastern Brazil (Rio de Janeiro and São Paulo), *L. chrysomelas* Kuhl of coastal eastern Brazil (Bahia), and *L. chrysopygus* Mikan of São Paulo. In general, *L. rosalia* is a golden-yellow marmoset sometimes varied with white or black on face and head, and with black on back, hands, and feet. *L. chrysomelas* is black with maned portion of face, arms, and upper side of at least proximal half of tail golden. *L. chrysopygus* is black on upper parts

and mane, golden yellow on inner sides of hind limbs and superciliary region.

Remarks.—*Simia leonina* Humboldt was based on two individuals seen living in captivity in Popayán, Colombia. They were said to have been brought from Mocoa (river and town at head of Río Caquetá) and the Río Putumayo, at eastern base of the Cordillera Oriental, Colombia. The original description and colored plate (Humboldt, *op. cit.*, p. 15, pl. 5) indicate a marmoset whose identifiable characters correspond to those of *Leontocebus rosalia*. To this day there has been no confirmation of the natural occurrence of a member of the genus *Leontocebus* anywhere within the Amazonian region. Until the contrary can be demonstrated, it is fitting to dispose of *leonina* in the synonymy of *rosalia*. *Leontopithecus fuscus* Lesson is simply a new name proposed for *Simia leonina* Humboldt preoccupied by *Simia leonina* Shaw, 1800. *Simia albifrons* Thunberg (1819, p. 65, pls. 3, 4) had been considered by some authors a *Leontocebus*. Cabrera (1940, p. 403) deemed it unidentifiable and also showed the name to be preoccupied by *Simia albifrons* Humboldt, 1812.

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